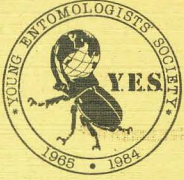


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Y.E.S. QUARTERLY

YOUNG ENTOMOLOGISTS' SOCIETY

ISSN: 0884-6677



James E. Zabotny

YOUNG ENTOMOLOGISTS' SOCIETY

Y.E.S. QUARTERLY

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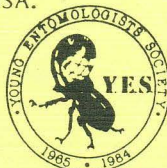
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INFORMATION FOR AUTHORS

Manuscripts and original artwork on any insect or Arthropod-related topic are welcome for publication in Y.E.S. QUARTERLY. Articles with special interest to young entomologists will receive publication priority. Manuscripts may be of any length, but should be double-spaced and typed (or neatly written). Photographs or maps should be done in black and white, and any drawings, charts, or graphs or maps should be done in black ink and should fit in the new page size. All authors should supply a title for their article and a complete mailing address. We're sorry, but no page proofs can be furnished.

Other features, including news, field notes, book reviews or other illustrations, are also accepted and will be used when space is available. Members may submit short "advertisements" for the "Trading Post" section, describing their special desires for information, correspondence or specimens. All ads will be edited for brevity and acceptability and their inclusion will be made on a space-available basis.

Send to: Young Entomologists' Society, c/o Department of Entomology, Michigan State University, East Lansing, MI 48824-1115 USA.



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NEWS**SOCIETY NEWS & BUSINESS****IMPORTANT BUSINESS**

Once again it is time to bring you up to date on new developments and business of your Society. That's right--I said **YOUR** Society. Your opinion matters as a member of the Young Entomologists' Society! If you have ideas, suggestions, comments or contributions for the this journal and our other Y.E.S. programs and services, I want to hear from YOU.

One way you can make your voice heard is to complete and mail in the annual questionnaire sent along with this issue of the journal. You can rest assured that these questionnaires are read and studied, and I strive to incorporate suggested improvements to our Society and its publications. Y.E.S. is great, but it can be better with your ideas and cooperation. On this same questionnaire you will also be asked to vote on a proposal to revise our dues schedule (for 1988). This is the first time in four years that we have had to consider this step, an unpleasant but necessary step. Please refer to your questionnaire for a detailed explanation of this matter.

This Fall issue of Y.E.S. Quarterly completes the volume for 1986. It also means it is time to renew your membership. I have thoroughly enjoyed serving your entomological needs in 1986, and I sincerely hope you will continue your participation on Y.E.S. in 1987! I hope you have, or are planning to, take advantage of the many, many services and programs that we designed with your needs in mind. I'm talking about the Swap Box program, the Tradingpost, the Section Advisors, the Y.E.S. International Entomology Resource Guide, the competitions, the scholarship program, our journal, etc. So, send in your renewal form today, before you forget! I would also like to encourage members, especially adults, to consider a sustaining membership - we need your help and support to continue improving our programs and services. All members are encouraged to promote our Society, even to recruit a friend or colleague.

I look forward to receiving your questionnaire and membership renewal!

ANNOUNCEMENTS

I am pleased to announce that the Entomological Society of Canada has renewed their support of Y.E.S. and its 1986 programs with a generous contribution. Their assistance is greatly appreciated; it definitely enhances the quality of our programs and services for youth, amateur and other entomologists around the world. THANK YOU, E.S.C.!

I would like to welcome Marek Latzmann of Brno, Czechoslovakia, the newest addition to our Society staff of volunteer artists. Welcome, Marek! We look forward to your contributions to our journal, and we appreciate your participation.

1986 YEAR-END SUMMARY

Nineteen eighty-six has been a good year for the Young Entomologists' Society. We have accomplished a lot that we can be very proud of. I thought it would be useful to quickly review our activities over the past year.

I think I am proudest of our fine journal, Y.E.S. Quarterly. We have come a long way in improving our format this past year. Each issue gets better than the previous one, thanks to the contributions of our authors. By the way, this year we will have published 357 pages of high-quality information. We had 34 members and 12 non-members (46 total) participate as authors. We have also been lucky to have a number of fantastic illustrations, drawings and photographs made available for use in the journal. I am especially thankful for being blessed with the talented individuals that make up our volunteer art staff: Sue Andres-Seabolt, Ryan A. Bridge, Lisa Resotko, Mark Khun, and Marek Latzmann. I also need to thank Rosie Spagnuolo Bickert and Jon M.L. Tomlinson for their assistance in putting together Y.E.S. Quarterly; without their help it would be impossible to put out our journal every three months.

One of the unique aspects of our organization is the volunteerism that makes running our Society a team effort. We owe a big THANK YOU to the 36 Section Advisors and 36 translators that work so hard for our Society. Without them we would not be able to offer assistance on virtually all entomological topics and translate 16 different languages into English.

Each and every one of our members has made some contribution to Y.E.S. programs and activities. I am thankful we have such a dedicated membership. You all make it possible to successfully run innovative programs like the Y.E.S. Swap Boxes (22 participants in 6 countries), the Tradingpost (the basis for forming networks to exchange information, advice, literature, and specimens), and the "Y.E.S. International Entomology Resource Guide". You also provide us with the funds to operate, help to promote the Society so it continues to grow, and send me your opinion and ideas when asked (I appreciate your sending in the annual questionnaire, and the many letters you send). THANKS for all of your contributions towards the success of our organization!

So, what have we accomplished in 1986. I've just given you some of the statistics, but that's not the whole story. There is no way to measure the friendships that have been built, the sharing of culture and knowledge, and the exchange of expertise that has occurred. I think it is here that our real success and achievement can be found. Yes, we can all be proud of what we have accomplished.

What of the future? I can't predict the future, but things sure look good to me! Our membership continues to grow, although somewhat slowly, and our journal is well received by individuals and institutions around the world. Our financial status could be a little better, as inflation has cut into the small edge we had above our annual expenses. We will probably have to increase our dues slightly and seek additional sources of funding, especially if we want to expand our programs and publications (for example, I still dream about the day when we can offer full-color illustrations in our journal). The key to our success in the future lies on our members. YOU have the power to shape our destiny as an organization, so I urge you to keep on participating in YOUR Society - the Young Entomologists' Society.



MAIL BAG

NPCA ANNOUNCES NATIONAL COMPETITION IN PEST MANAGEMENT RESEARCH

The National Pest Control Association (NPCA), USA, announces the establishment of a national research report competition for undergraduate and graduate students working in Urban Pest Management Research.

The prizes will be cash awards and certificates of honorable mention. The monies for these awards come from the NPCA Phil Spear Research Fund. The scope of the reports "shall be related to the management of invertebrate or vertebrate pests which infest structures or which impair the well being of the occupants of structures."

Information on the purposes, scope, requirements, and awards for the contest is available from Y.E.S. International Headquarters, or the National Pest Control Association, 8100 Oak Street, Dunn Loring, VA 22027 USA. (Note: The competition does not appear to be limited to US students., Editor)

Y.E.S. INTERNATIONAL ENTOMOLOGY RESOURCE GUIDE SALES

Sales of the newly published "Y.E.S. International Entomology Resource Guide" have been pretty good as of 6 October 1986, with over 100 copies sold. As soon as some promotional advertising comes out in other entomology journals I expect that sales will really take off. For the time being the supply is adequate, but if you want a copy I suggest you send in your order today before the supply is exhausted. Send requests to Y.E.S. International Headquarters, Department of Entomology, Michigan State University, East Lansing, MI 48824-1115 USA and please enclose US \$3.00 to cover the cost of printing and mailing.

BEETLEMANIA IN NEW HAMPSHIRE (USA)

"Beetlemania" has struck in a small town along the Connecticut River in westcentral New Hampshire. It seems the residents have passed a resolution to adopt *Cicindela marginipennis* Dejean, the "cobblestone tiger beetle", as their official town insect. This particular tiger beetle is rather uncommon, and other than the several sites in New Hampshire it occupies, it is also known from Pennsylvania, New York, New Jersey and Ohio. It inhabits riparian islands and shorelines composed of bare cobblestones, and because of the threat to the limited number of remaining habitats this beetle has been proposed for addition to state and federal threatened and endangered species lists. Incidentally, the sites near Plainfield, NH are threatened with inundation by proposed dam construction on the Connecticut River. Just think, if these beetle populations weren't discovered by myself and Donald A. Wilson in 1978, these beetle populations would have disappeared without humans even knowing about it! Now, how's that for a contribution to science by amateur entomologists!

**FIELD COLLECTIONS OF YOUNG/AMATEUR ENTOMOLOGISTS:
THEIR POTENTIAL CONTRIBUTION TO SCIENCE**

**Donald Baumgartner
150 S. Walnut St.
Palatine, IL 60067 USA**

Many taxonomic, systematic, and distributional studies rely heavily on large samples of particular species from large geographic areas. Other biological, ecological, and economic works are also based on many samples. However, extensive field collecting over large areas is often prohibitive because of high travel costs and the man-hours needed. Alternatively, researchers widely study specimens decades old from museum collections. Unfortunately, these collections are usually meager in many species and they are useless in following recent ecological, biological, and distributional changes in the insect fauna (e.g. introductions, range expansions).

Among the membership of the Young Entomologists Society, and other societies like it (biology clubs, local insect clubs, 4-H groups, etc.) exist large reserves of untapped resources; young aspiring entomologists and adult amateur collectors, who can contribute significantly to the field collections of museums and specialists alike. Their collections, covering various local areas, may be quite extensive and general in nature, or may concentrate on particular families. But these collections serve little purpose unless they are scrutinized and studied. This is where the contact and mutual cooperation between professional entomologists and amateurs are important to scientific discovery or contribution to overall study projects. Particular specimens not already present in the amateur collections may be collected by the novice for a study if given proper instruction by the professional. Often, students and amateurs are more willing to collect for research investigations than are graduate and professional entomologists, even though the latter may be more qualified.

A successful collection effort and cooperation between expert and non-expert benefit both parties. The expert gains specimens and knowledge he would not have otherwise, which may become incorporated into a future publication. The aspiring young entomologist, or hobby collector, gains experience in purposeful specimens and data collecting, acquires professional contacts, becomes experienced in packaging and shipping material, may learn manuscript preparation, and, most of all, is awarded by the satisfaction that he/she has contributed to yet another new discovery. This involvement also further instills interest in young people who have chosen entomology as a career.

My collaboration with fellow members of Y.E.S. has proved successful in the long run and resulted in two short entomological publications (Baumgartner 1986 and Baumgartner in press) which would not have been possible without the efforts of these members. In my experience, only one or two out of ten members are cooperative enough or willing to collect specimens and maintain contacts, without reimbursement, other than postage for shipping material. However, their extensive collections recorded new range extensions of medically important blow flies; the discovery and specimens were important enough to become part of the U.S. National Museum collection.

I encourage all professional Y.E.S. members to contact other young entomologists for assistance in their research efforts. This is an important Society resource that is largely neglected. Non-professional members may also contribute by initiating their own correspondence with museum curators and other specialists, some of them Y.E.S. members (see membership list). Identified specimens are much more valuable than those scattered in an insect drawer. Through correspondence with taxonomists and shipment of material, your specimens are brought to the attention of specialists, who through their knowledge and familiarity with the literature, are able to recognize new discoveries. Perhaps even now lying in YOUR own collection are new species or undiscovered relationships which may contribute to our knowledge of the insect world.

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- Baumgartner, D.L. (in press) Chrysomya spp. (Diptera: Calliphoridae) new to Venezuela. (submitted to Biotropica)

(EDITOR'S NOTE: I urge all Y.E.S. members to use the Tradingpost section of this journal to announce their research or study needs (advice, literature, specimens, etc.). Those who are willing to offer assistance in collecting for others, making determinations, and the like are also encouraged to announce their willingness to cooperate. The Tradingpost makes an excellent forum or "bulletin board" to enlist the aid of other Y.E.S. members in your research projects. You would be surprised how often we can match up needs with offers for assistance!)

REPORT OF THE XERCES SOCIETY MEETING

Eric R. Eaton
2310 S.W. Bertha Blvd. #5
Portland, OR 97201 USA

Here is a recipe for a terrific time: Take 62 scientists and amateur entomologists, add a healthy dose of lively discussions and exciting oratory, a pinch of rain, and a dash of music, dance, and outdoor travel. Combine all ingredients at Pilgrim Firs Camp and Conference Center on the Olympic Peninsula of Washington State, and allow to simmer for four days. Presto! You have the 13th annual meeting of the Xerces Society!

Author Robert M. Pyle, the "Founding Father" of the Xerces Society, hosted the extravaganza June 4-8 of this year. The Xerces Society is an organization devoted to the protection and conservation of arthropods, and the programs of the meeting reflected this concern. Speakers addressed many topics, including the protection of the Monarch butterfly roosting sites in Mexico, the extinction of a native Urania moth in Jamaica, conservation of Speyeria fritillaries in the Great Plains of the U.S.A., and efforts to form a nature preserve in Costa Rica, chiefly to protect the nesting grounds of Centris bees. The presentations were not without their lighter moments, however, and Dr. Pyle started things off with "Butterfly Faces", a slide show of nothing but Lepidoptera perched upon human noses!

The "drudgery" of business meetings and speakers was broken into regular intervals by delicious meals, a social evening, and a field trip. The social event featured live music, dancing, wine, ales, cheeses, and a silent auction of entomological art. Everyone literally kicked up their heels that Friday night!

The following morning, a tour bus took us up to Olympic National Park. By the time we arrived at the Staircase Ranger Station, the sun had broken through the clouds, allowing perfect weather to watch a resident osprey (fish hawk), and, of course, insects. A Papilio rutulus and P. eurymedon posed patiently for a Swedish student/photographer. The trails laced through dense conifer forests, along a swift, clear river. What scenery!

Too soon the fun ended, but not before we had become well-acquainted with each other in a very informal atmosphere.

Thanks mostly to the enthusiasm and leadership of President Mary Hathaway, the Xerces Society has become a rejuvenated association of dedicated, good-natured conservationists, including professionals like Dr. E.O. Wilson, Dr. Paul Ehrlich, the Honorable Miriam Rothschild, and Roger Tory Peterson.

For those interested in joining, membership inquiries should be addressed to Secretary Lawrence Gall, The Xerces Society, Department of Entomology, Peabody Museum, Yale University, New Haven, CT 06520 USA. Benefits include the "popular" publication Wings, the technical journal Atala, and next year's annual meeting in Gainesville, Florida!

SOME THOUGHTS ON STARTING AN INSECT "ZOO"

Paul Orselli
Nature Programs Specialist
Cranbrook Institute of Science
P.O. Box 810
Bloomfield Hills, MI 48013 USA

I maintain a small insect zoo at our science center, so I am often asked for advice on starting these displays of living insect. Here are a few items for thought if you are contemplating such a venture:

(1) RESEARCH the habits and requirements of the insects (or other invertebrates) that interest you. Are they easily maintained? Can you feed them? Will they reproduce readily? Would there be any problems of some of them escaped from culture? What are their temperature, light and humidity requirements?

(2) HOUSING the animals is also an important consideration (both in rearing and display). Just about any clean glass or plastic container can be used to rear insects, but for displaying the insects you will probably want to use a 10 gallon aquarium fitted with a screen top to prevent escapes and meddling by curious spectators. (You will probably want to attach the screen with screws so that it can not be easily removed.) Filling the bottom of the tank with a mixture of gravel, woodchips and a small amount of soil (the amount depending on whether or not you are planning to include any live plants) provides a good substrate. Your insects will also need to have water, and petri dishes or jar lids provide places to put water (and food) in the tank. CAUTION: make sure you have a sponge or paper towel in your water dish so that small insects don't drown!

(3) WHAT ARE SOME EASY TO REAR INSECTS/INVERTEBRATES? Any of the following are good bets: "giant" cockroaches (*Blaberus* spp.), milkweed bugs (*Oncopeltus fasciatus*), house crickets (*Acheta domestica*), tarantulas, mealworms (*Tenebrio* spp.), various aquatic nymphs and/or most butterfly or moth larvae.

(4) WHERE DO YOU GET INSECTS FOR STARTING YOUR ZOO? The answer is: any number of places! Start locally - check with pet stores, school biology departments, or any local college or university entomology departments. Don't forget that it is possible to go out into the woods and fields near your home and collect your own insects for rearing! Many insect species can also be purchased by mail order from biological and entomological supply houses. (Editor's Note: See the Y.E.S. QUARTERLY "Tradingpost" and the "Y.E.S. International Entomology Resource Guide" for suggested names and addresses.)

(5) SUPPLEMENTAL MATERIALS can make your "zoo" more interesting and informative to the viewer by providing little extras for learning. You might consider the following: mounted insects that can be examined by microscope or magnifier, pictures or photographs of exotic insects, and models that simulate insect vision, breathing, etc. (These types of materials are available from a variety of biological supply houses.)

FIREFLIES - JEWELS OF THE NIGHT

Pam and Richard Winegar
152 S. Purdue Ave.
Oak Ridge, TN 37830 USA

Everyone is familiar with the sight of fireflies on a summer evening. Fireflies, or lightning bugs, are beetles belonging to the family Lampyridae, a name based on an old Greek word that also evolved into our word "lamp".

In Tennessee, in the southeastern United States, there are two prominent types of fireflies - Photinus pyralis and Photuris pennsylvanica. Over 75 species are known to occur throughout the United States. Photinus starts to be visible around dusk, especially on warm humid evenings. Females rest on the ground or low-lying vegetation, and flash in response to the males. The males fly near the ground in a strong undulating pattern, approaching the bottom of one of these undulations every 6 seconds. As he does so he makes a half-second flash, simultaneously rising and making a luster of yellow-green light. As it gets darker, the males fly higher and eventually scatter. In contrast, Photuris becomes prominent after dusk when it becomes fully dark. Photuris flashes many more times per minute than Photinus. Also, Photuris prefers to stay high up in the trees, instead of near the ground like Photinus.

During the day, fireflies nestle on grass or low vegetation. They have few natural enemies. Birds and bats do not eat them. There are some frogs in the tropics, though, that gorge themselves on fireflies. The frogs eat so many fireflies, in fact, that their stomachs glow bright enough to light up their anatomies like an X-ray!

One enemy that fireflies have, besides the frog, is the spider. If a firefly is under stress, such as when caught in a spider's web, its taillight glows brightly and continuously. Even the shock of a firecracker or thunderclap may cause a field of fireflies to light up in unison, although this is unusual in the temperate zones. In the tropics, though, there are fireflies that always flash in unison. In Malaya, for example, trees along the river banks take on the appearance of Christmas trees with the light of synchronously flashing fireflies. The fireflies light up in perfect unison at the rate of about two times in three seconds, the tree being in complete darkness between flashes.

A patient observer can lure male fireflies of Photinus by simulating with a flashlight the response of the female found on the ground. To begin, wait for a firefly to flash near you while flying past. Wait two seconds, and then quickly turn your flashlight on and off in response. If you flashed at the proper interval, the male firefly will fly closer to you and flash again. Wait two seconds, and then flash again in response to the male. This may be repeated again and again until the male alights near your flashlight!

Females of Photinus can be induced to flash by imitating the males which flash to them from above. Quickly turn your flashlight on and off over an area in your backyard, and you may get lucky and see several females flash in response. Females only flash when ready to mate. If you catch male and female fireflies of the same species, such as a Photinus,

you can put them together in a large jar or other suitable container so that they might mate. Be sure to place some moistened soil in the bottom, and have a cover that allows plenty of air to come through. Once the fireflies do mate, the female will burrow into the soil in a few days and lay eggs. About 3-4 weeks later the eggs will hatch into elongated, flattened brown larvae (looking like a roly-poly or sowbug). About 1-2 days before hatching, the eggs glow brightly.

The larvae are predacious and hunt at night. Too many must not be kept in a single container or they may eat each other. We have found that our larvae of Photinus prefer to eat earthworms, but larvae are also reported to eat slugs, snails, and other soft-bodied creatures. Some people have been reported rearing the larvae on cream cheese and raw meats. To eat, the larvae inject an anesthetic into the victims soft flesh. When the victim is paralyzed, the larvae secrete digestive fluids to liquefy the tissues, and then suck the liquid in. Firefly larvae are known as "glow-worms". The Photinus larvae that we reared had two glowing spots on the underside near the tail.

Firefly larvae of Photinus take two years to reach maturity. At the end of their first summer they cease eating and overwinter in the soil. Their second summer, they continue to eat and grow, and overwinter again in the fall. At the start of the next spring the larvae will "awaken" and pupate in the soil. It will build a mud chamber, and at the end of 10 days metamorphosis will be complete. The newly formed firefly will break through the roof of its chamber and fly off in search of a mate. It has been disputed whether adult fireflies eat, but we feel that adults of Photinus species, at least, do not. A mate must be found quickly because adult fireflies only live approximately two weeks.

One of the most interesting aspects of the firefly is the light. The light results from the firefly's small internal injections of ATP (adenosine triphosphate) into the a mixture of luciferin and luciferase in the tail. Although the reaction is not completely understood, it is well known as a marvel of virtually "heatless" light.

Researchers are particularly interested in the luciferase component of the fireflies taillight. Luciferase is an enzyme that can not be synthesized - its only source is the firefly. Luciferase is being developed as a tool which can help doctors screen for urinary infections, evaluate blood cells, test antibiotics, and explore the workings of cancerous tumors.

An extract of the firefly "lantern" can also be used in future unmanned space flights to test for life on other planets. Mechanical devices would collect material from the planet and mix it with a bit of firefly extract containing luciferin and luciferase. If the material holds even a single cell containing ATP (which means life as we know it), the mixture will glow, and a light-sensitive instrument will send the message back to Earth.

Fireflies are also being studied for future use as "shark-repellents". This would be of great significance to divers all over the world. A poison was discovered in fireflies that is similar to pardaxin. Just four ground up fireflies per liter of water is enough to make sharks thrash around before their muscles lock up in paralysis. This just goes to show that through the quirks of nature you never know what discovery may be made concerning your favorite insect!



Fig 1. Illustration of the underside of the firefly Photinus pyralis tail segment (a) female and (b) male. White section lives off light.

A FORGOTTEN, BUT VERY EFFECTIVE, METHOD
FOR CLEANING INSECTS OF
SOIL AND DEBRIS

Zbysek Sustek
Institute of Experimental Biology and Ecology
Slovak Academy of Sciences
Obranov mieru 3
814 34 Bratislava, CZECHOSLOVAKIA

Many richly sculptured beetles, like Trogidae or many Tenebrionidae, are frequently covered with a firm crust of soil, plant parts or other debris. Cleaning these types of specimens is not always easy because of danger to the specimens, especially those covered with pubescence or white waxy deposits (as in some Tenebrionidae). A method for cleaning these types of specimens can be found in Reichardt's (1936) paper on the Palaearctic Opatrini (which incidentally contains a still-useful key to this group).

At first glance this method appears rather drastic, but it is in fact very easy and effective. Soiled beetles are placed into a hot 10% solution of potassium hydroxide (KOH) for 10 to 20 seconds; or, drops of the solution can be placed on soiled areas (elytra, pronotum, mouthparts, etc.) with a pipette or brush. In a surprisingly short amount of time the crusted deposits are destroyed and sand particles fall into the solution, even from specimens with the densest pubescence. Any remaining deposits can usually be loosened or removed with a fine, soft brush. The remaining KOH solution on the specimen can be neutralized with a 30% solution of acetic acid, and then removed by washing with clean water.

IMPORTANT NOTE!! The KOH solution must be heated in a water bath by placing the KOH container in a larger container of water. The container with the KOH must never come in direct contact with a heat source or flame. In all cases it is advisable to protect your hands and face with suitable protective gear. However, with these few precautions the method is entirely safe, rapid and effective.

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THE GIANT FLOWER-LOVING
FLIES OF THE GENUS RHAPHIOMIDAS
(DIPTERA: APIOCERIDAE)

Rick Rogers
2630 Palm Drive
Hermosa Beach, CA 90254 USA

Along with the Mydidae and some of the Asilidae, the flies of the genus Rhaphiomidas in the family Apioceridae are the largest North American Diptera. In spite of their size, however, they are very fast flyers and often hover while taking nectar at flowers - in fact, they are so fast, an extra long net handle in almost a necessity for collecting them! In the field you can sometimes hear the flies before you see them - the buzz is similar to that of a large robber fly, but much louder and more erratic.

These flies are only found in the desert and semidesert regions of California, southern Nevada, Arizona, New Mexico, Baja California, and northwestern Mexico, usually on or near sand dunes, dry rocky washes with sandy areas nearby, or coastal dunes near the ocean. Data labels of specimens indicate a division into three periods of seasonal activity: spring species (March - May), a summer group (May - September), and fall species (September - October).

Dr. Mont A. Cazier, the premiere authority on this family of flies, lists 17 species - he is the author of most of them - plus 5 subspecies. A typical adult (R. nigricaudis Cazier) is illustrated in figure 1. For a good color photo of a live R. trochilus, see Simon & Schuster's Guide to Insects, No. 326 (Note photos are transposed - see No. 323...the size should read 28-35mm.) In his new revision of the genus (more about that later), he says he "would expect that additional species will be found in the Mexican states of Sonora, Sinaloa, Nayarit, Jalisco, and perhaps Colima when these states are more thoroughly collected; also, from the area between the Colorado River in Arizona and the Rio Grande River in New Mexico and possibly Texas. The very rapid flight and other difficulties in capturing these flies is probably responsible for these distributional gaps".

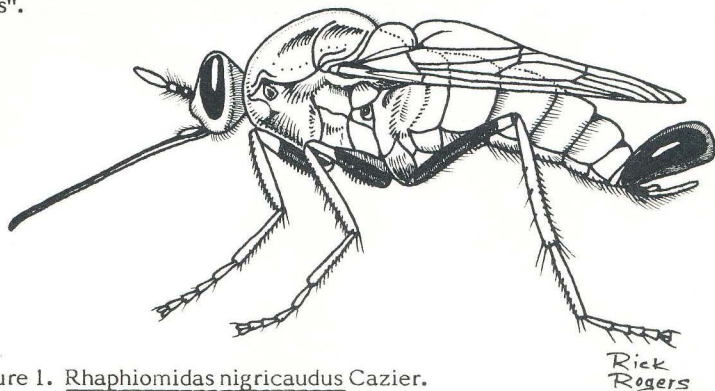


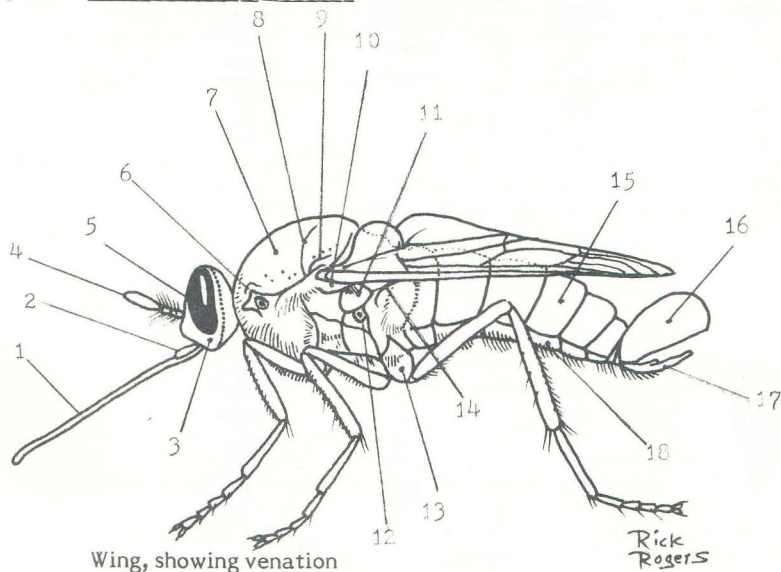
Figure 1. Rhaphiomidas nigricaudis Cazier.

Biological information for the genus is very limited. Rhaphiomidas parkeri has been seen ovipositing (in sand), one species has been taken in copulation (R. painteri), and only a very few pupal cases have been found: one by Carl Hall at Manhattan Beach, CA (R. terminatus), one by Mont Cazier 2 miles south of Cronise Dry Lake, San Bernardino Co., CA (R. tarsalis?), and one that I found at Colton, near Rialto, San Bernardino Co., CA (R. terminatus abdominalis). It's likely that a few other have been found but not reported.

Very recently (9 August 1986, 1730h), I made the following observations on the oviposition behavior of Rhaphidiomydas terminatus abdominalis Cazier 1941 collected from the locality at Colton, near Rialto, San Bernardino Co., CA. The activity took place in a 10-gallon aquarium filled with one inch of clean sand. From my notes: "The female's abdomen is extended about twice the normal length, then the movable acanthophorites near the genital opening spin around in a half circle, drilling out a shallow depression in the sand...she then backs into the sand until the entire abdomen is buried. At the same time, the wings move in a rather slow scissors-like motion and the sides of the abdomen expand and contract. The fly took about one minute to oviposit, and each time this was completed it would hop (the wings were held in a resting position) two inches away and repeat the same behavior. The total number of eggs found in the sand was 40, and it is my guess this is about the average because of the large (3mm) size of the eggs. They are oval, almost kidney-shaped, and pure white with a slight pink iridescence.

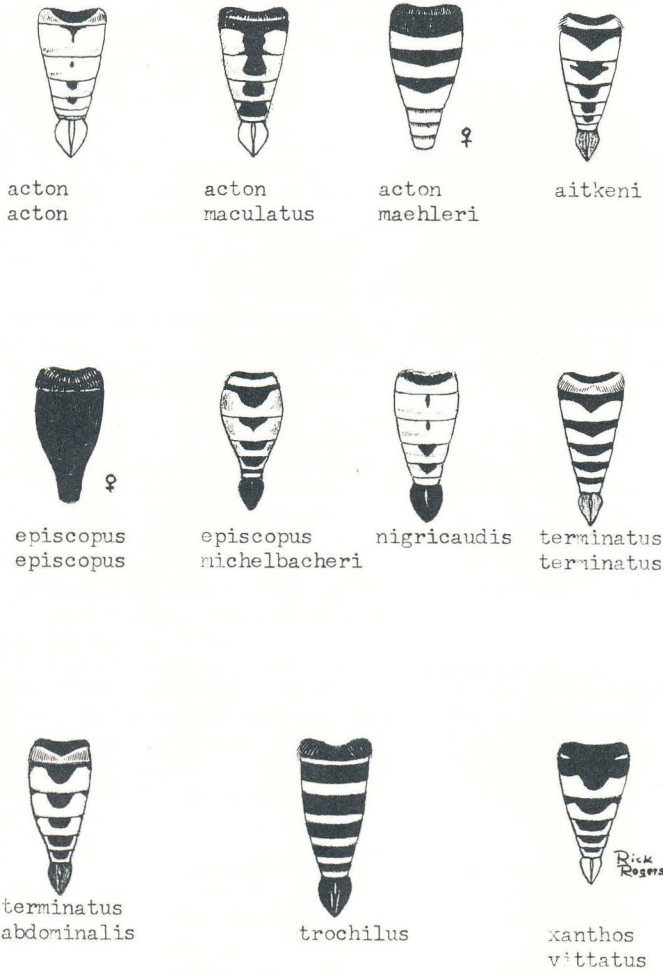
No larvae have ever been collected. The best place to look for larvae would, of course, be where empty pupal cases have been found - in the sand near the base of desert plants.

This article has been somewhat of a "Reader's Digest" version of the afore mentioned new publication by Mont A. Cazier - to whom I give thanks for stimulating my interest in these flies. For more information on this interesting genus, you may want to send for a copy of Cazier (1985), "A Revision of the North American Flies Belonging to the Genus Rhaphiomidas (Diptera: Apioceridae)", Bulletin of the American Museum of Natural History Vol. 182, article 2. It sells for US \$6.55 per copy plus postage (probably about \$2.00). Send requests to: American Museum of Natural History Library, Dept. D, Central Park West at 79th St., New York, NY 10024 USA.

Figure 1. Rhaphiomidas nigricaudis Cazier (male)

- | | | |
|----------------------|--------------------------------|----------------------------|
| 1. Proboscis | 7. Mesonotum | 13. Hind coxa |
| 2. Palpi | 8. Transverse suture | 14. Haltere |
| 3. Gena (cheek) | 9. Post-alar callosity | 15. Abdominal tergite (#4) |
| 4. Antenna | 10. Basalare | 16. Hemitergite |
| 5. Frons | 11. Postnotal conical swelling | 17. Gonostyle |
| 6. Pronotal spiracle | 12. Metathoracic spiracle | 18. Sternite (#4) |

Abdominal markings of *Rhaphiomidas*



(Aprox. to scale- slightly enlarged)

Figure 2. Abdominal markings of *Rhaphiomidas* spp. (approx. life size).

Annotated list of *Rhaphiomidas* species

(Note: sizes do not include proboscis)

***R. acton acton* Coquillett, 1891** (male and female 26-30mm)

The most common species, also the most variable - with the most extensive distribution. Abdominal markings may be lacking, or rather small. CALIFORNIA: Mono Co., Inyo Co., Kern Co., Los Angeles Co. (north and east areas), San Bernardino Co., and Riverside Co. May 2 - September 6.

***R. acton maculatus* Cazier, 1941** (male and female, 26-30mm)

Similar to the above, but with larger mid-dorsal abdominal markings, and longer pile. CALIFORNIA: San Diego Co., MEXICO: Baja California Norte. June 4 - July 20 (May 17+ in Baja California).

***R. acton maehleri* Cazier, 1941** (male and female, 26-30mm)

Male is almost identical to *acton acton*, but female has abdominal segments two to four pale yellow with broad or narrow black transverse bands. CALIFORNIA: eastern San Bernardino Co., eastern Imperial Co., e. Riverside Co.; ARIZONA: Yuma Co. and Mohave Co. April 8 - May 29.

***R. aitkeni* Cazier, 1941** (male 21mm, female 24mm)

Abdominal markings as shown (fig. 3). CALIFORNIA: Inyo Co. (Death Valley area); NEVADA: Nye Co. May 28 - July 15.

***R. auratus* Cazier, 1985** (male and female 19mm)

Abdominal segments mostly orange, with small mid-dorsal dark markings - white and golden pile. CALIFORNIA: Inyo Co.; NEVADA: Clark Co.; ARIZONA: Mohave Co. (8 miles E. of Mesquite, Nev.). Apr. 26 - July 11

***R. brevivostris* Cazier, 1954** (male 24-29mm and female 23-24mm)

Abdomen black, tergites one through seven gray pruinose, and covered with long white pile. Each tergite with a narrow yellow band apically. Proboscis short - protruding beyond antennae by about 1 and 1/2 times antennal length. MEXICO: Sonora (La Choya; 20 mi SW of Sonoita; 39 mi N of Puerto Penasco); ARIZONA: Yuma Co. (15 mi E of Yuma). May 1 - June 13

***R. episcopus episcopus* Osten Sacken, 1877** (male and female 21-25mm)

Easy to recognize - one of the two all black species, and robust. MEXICO: Baja Calif. Sur (San Jose de Cabo). September 4 - 30.

***R. episcopus michelbacheri* Cazier, 1985** (male and female 21mm)

Abdominal segments mostly orange, with mid-dorsal black maculations. MEXICO: Baja Calif. Sur (Todos Santos area). August 29 - October 17.

***R. forficatus* Cazier, 1985** (males 24mm and females 22-23mm)

Abdomen similar to *brevivostris*, but with apex of right hemitergite strongly overlapping apex of left (appearing forked). Male has middle and posterior tarsi with double row of stout black spines. MEXICO: Baja Calif. Sur (San Ignacio; 25 mi S of Santa Rosalia). Apr. 14-15.

***R. hasbroucki* Cazier, 1985** (male 19-24mm and female 20-24mm)

Abdomen with all segments primarily orange, first with long white hair overlapping base of segment two; black maculations variable. CALIFORNIA: Riverside Co. (2 mi S of Rice); ARIZONA: Yuma Co. (area SE of Parker). May 7 - June 29.

R. hirsuticaudus Cazier, 1985 (male 29mm and female 33mm)

Abdomen primarily black, tergite 1 gray pruinose, and 2 through 5 sparsely white pilose. Male terminalia reddish-brown with sharp angle upward, with long golden hairs. Proboscis short, protruding beyond antennae by slightly less than antennal length. CALIFORNIA: Imperial Co. (area near Glamis); ARIZONA: Yuma Co. (Yuma). Sept. 3 - Feb. 23. (A female was taken at a black light trap.)

R. nigricaudis Cazier, 1985 (male 23mm and female 25mm)

See fig. 1 for abdominal markings of male. Female with abdominal segments banded with black and pale yellow. CALIFORNIA: San Diego Co. (Anza Borrego area), Imperial Co. (Borrego Valley), Riverside Co. (Morongo/Palm Desert area); ARIZONA: Yuma Co. (Ligurta). April 9 - May 21.

R. painteri Cazier, 1941 (male and female 20mm)

Abdomen pale orange, tergite one primarily black, two with irregular, medial dark area, two through four with narrow black apical border, five and six entirely pale orange. terminalia small, pale orange. NEW MEXICO: Dona Ana Co. (near Las Cruces); TEXAS: El Paso Co. August 28 - September 24.

R. parkeri Cazier, 1941 (male and female 22mm)

Abdominal tergites dark brown or black, with narrow apical bands of pale yellow. Male terminalia rounded, hemitergites overlapping. Proboscis long (8-10mm). CALIFORNIA: Riverside Co. (Blythe), Imperial Co. (Palo Verde, Glamis), San Bernardino Co. (12 mi S of Cadiz); ARIZONA: Yuma Co. (Parker area), Pima Co. (Molino Basin). April 8 - May 7.

R. socorroae Cazier, 1985 (male 23mm, female unknown)

Looks very much like terminatus abdominalis. MEXICO: Baja Calif. Norte (dunes S. of San Quintín). May 17 - 18

R. spinicaudus Cazier, 1985 (male 21mm, female unknown)

Primarily all black, male terminalia distinct: hemitergites internally toothed and with short, erect spines. Proboscis long (01mm). MEXICO: Baja Calif. Norte (Millers Landing). March 30
(Note: this species is known from 3 males specimens.)

R. tarsalis Cazier, 1985 (male 21-25mm, females 17-24mm)

Abdominal tergites one and two black basally, three to six entirely silky orange. Has long curved hairs on the ventral surface of the first metatarsal segment. CALIFORNIA: San Bernardino Co. (Kelso Dunes). May 24 - June 30

R. terminatus terminatus Cazier, 1941 (male and female 25-27mm)

Abdominal segments banded with black and pale yellow as shown. Male terminalia dark reddish-brown. CALIFORNIA: Los Angeles Co., (El Segundo Dunes, Huntington Park). July 15 - August 6.

(Note: perhaps ironically named as this is very likely an endangered species.)

R. terminalis abdominalis Cazier, 1941 (male 20-25mm, female 21-26+mm)

Abdomen similar to above, but marked as shown in fig. 3. CALIFORNIA: San Bernardino Co. (Bloomington, Colton, Rialto), Riverside Co. (Mira Loma). August 10 - September 24.

R. trochilus Coquillett, 1892 (male 28-30mm, female 33-35mm)

Abdominal segments black, narrowly bordered with pale yellow. Male terminalia black. CALIFORNIA: Contra Costa Co. (Antioch), Merced Co., Stanislaus Co., Tulare Co., and San Joaquin Co. July 8 - Sept. 9

R. undulatus Cazier, 1985 (male 29mm, female 35mm)

Similar to acton acton, but larger and has distinct male terminalia with undulated shape. CALIFORNIA: Riverside Co. (Palm Springs area), San Diego Co. (Borrego Valley). May 10 - June 17.

R. xanthos xanthos Townsend, 1895 (male 24mm, female 26mm)

Robust, abdominal tergites orange or yellowish, mid-dorsal black maculations in male, transverse band in female. Male terminalia small. MEXICO: Baja Calif. Sur (San Jose del Cabo, Todos Santos). August 11 - September 30.

R. xanthos vittatus Cazier, 1985 (male 20mm, female not known)

Similar to the above, but with abdominal markings as shown in fig. 3. MEXICO: Baja Calif. Sur. (NE of Todos Santos). October 8.
(Only the male holotype is known at this time.)

THE FIRST EARS THAT WERE PIERCED
(A STORY)

Michelle Yokoyama
1825 NW Grant Ave.
Corvallis, OR 97330 USA
(Age: 8)

Once before people were on Earth there were bees. Bees had had stingers all the time. The bees knew what the stingers were for, but they also knew how unfoolish the animals around them were so they never used them. But when people came, they knew how foolish they were, so they stung people.

One day a very smart bee said "I think it might hurt more if I stung people in their ears!" So he stung the first person he saw. The person happened to be a woman. So when another bee saw the stinger in her ear, he thought it was a good idea and he stung her in the other ear.

The woman pulled out the stingers and said, "I have pierced ears!" And that is how the first ears were pierced.



COLOR-CODED LABELS FOR INSECT SPECIMENS

Gary A. Dunn
Department of Entomology
Michigan State University
East Lansing, MI 48824-1115 USA

I have found that the use of color-coded "bionomics" (ecology) labels really helps emphasize the collecting and habitat information for many of the specimens collected contained within my 30,000 specimen beetle collection (Cicindelidae and Carabidae). Specimens should not only be viewed as a representative sample of biological populations only. They should also represent data (information) on the habitat preferences, behavior patterns, bait preferences, and response to various collecting techniques of various species. It is this information that really makes insect specimens valuable to many researchers.

In my mind, much of this bionomic and collecting information can be grouped into categories involving connection to semiaquatic habitats, flowering plants, light sources, attractants and baits, and specific collecting devices (such as pitfall traps). This has become the basis for my system of using color-coded labels on my pinned specimens. The colored labels allow me to quickly and easily locate specimens in the larger collection according to their bionomics.

I have chosen yellow to represent response to light sources (e.g. propane lantern, UV blacklight, "at lights", etc.), brown for attractants and baits, pink for those taken from flowers, green for those collected by pitfall traps, light blue for those collected from semiaquatic habitats (under drift, by treading, etc.) (Note: I have deliberately chosen to stay away from using RED and BLUE because of their use to designate paratype and topotype specimens, respectively.) It is important to understand that the color label paper is used only to provide visual clues to the bionomic and collecting information for specimens. The labels themselves must still contain accurate, detailed (as much as possible), **printed information** on the specific habitat, host plant, or collecting method!

COLLECTING NOTES FROM ARIZONA (USA)

David Williams
203 West 18th, Apt. B
Santa Ana, CA 92706 USA

August 15, 1981

On nearly every trip I make to Arizona, one of my first stops is along the road above Peeples Valley. Here, closely bordering the highway of this high flatland, are abundant patches of Asclepias (milkweed), whose blooms attract some groups of insects like a magnet, especially the huge tarantula-hawk wasps. This year's stop is a particularly good one, for I find my first specimens of Pepsis formosa formosa and P. arizonica amongst numerous examples of P. thisbe, P. mildei, P. chrysothemis, and the big, black P. formosa pattoni. My fellow collector, Rick Villegas, succeeds in capturing a fine asilid bumble bee mimic, Mallophora faultrix bromleyi, before we head up the road to our camp for the night.

August 17, 1981

Just east of Portal, AZ, is a large field (now fenced) with heavy brush and open grassy areas. One of the most common small predators there is the attractive little green-eyed robber fly Mallophorina pulchra, which occurs in abundance. We take extra care searching this area after our experience the previous evening when Rick made the close acquaintance of a hefty diamondback (rattlesnake) in a ditch outside of Rodeo, New Mexico. There really is nothing quite like having the tranquility of sunset in the Chiricahua Mountains interrupted by a crotalid welcoming party of one sounding its distinctive fanfare at close range! Fortunately, all of our encounters (there were others) with Crotalus were safe ones, but one does have to keep watch for them while stalking or chasing insects. Before leaving the roadside field I take specimens of the slender, ant-like sphecoid wasp Ammophila wrighti and A. formicoides.

August 18, 1981

This became a scouting day since we didn't know the area very well. A drive down the road towards Animas, New Mexico, yielded Hemipepsis ustulata ustulata from roadside blooms. Later, upon returning a stop along the roadside below Roadforks, I chased and captured what appeared (even in the net) to be a medium sized Pepsis or Hemipepsis. But no! It is Conocalama - a large, attractive ichneumon wasp, and a fair Pepsis mimic.

August 19, 1981

Ominous storm clouds precede us in our drive through Dos Cabezas, AZ, on our way way to camp for the night at Stockton Pass. At several roadside stops I find Pepsis f. formosa and the brilliant green sphecoid wasp Clorion aerarium. A fruitless and generally miserable stormy night awaits us at the camp east of Bonita, AZ; we both scour the area in the peaceful morning aftermath and are rewarded by the sight of a virtual collection of Eleodinae beetles. One of them, Philolithus morbillosus, is the only one of this genus I have ever collected.

August 20, 1981

Wishing to cool off a bit before returning home across the Mojave Desert, we take a drive through Payson, AZ. Along the main street curbs of this nice city in the high (5000') Coconino National Forest, we find a perfect male Dyanstes granti (Grant's rhinocerus beetle) as well as other smaller scarabs. Just a ways north of town is a huge patch of (what else?) Asclepias near the turnoff to Mammoth Cave. Careful, selective collecting produces specimens of Pepsis mexicana, P. cerberus and a black-antennaed P. mildei. The most common phase of this latter species has bright yellow-orange antennae, the predominant coloration in California specimens I have encountered.

May 29, 1982

The gravel road taking us from Pena Blanca Lake (northwest of Nogales, AZ) to Arivaca, proved to be one of our favorite trips, even though collecting was a bit light. This is attractive, rugged mining country with sweeping grassy valleys and picturesque mountains. Turreted burrows of huge wolf spiders (probably Lycosa carolinensis) can be found a short distance from the roadside. Also in abundance here are the webs (!) of the big web-spinning wolf spider Sossippus californicus.

May 30, 1982

Awaking early in the morning at our makeshift camp, we find that we had not been the only hunters in the area. Under the lawn chair where I had loafed by our blacklight the previous evening was precisely the one creature any collector would want to cuddle up to for a spell: the cone-nose bug Triatoma recurva. And I suppose it was just as delighted to see us as we were to see it, though for somewhat different reasons I am sure.

I have a fascination with large rocks and, with considerable effort, managed to lift one end of a fair-sized boulder not far from camp. Several repeat performances later, I was rewarded by the sight of a pair of tiny funnelweb tarantulas of the genus Euagrus residing underneath. Not so impressive (they're only 8mm) as the giant Aphonopelma common in Arizona, Euagrus is still a good find!

July 24, 1982

My car broke down between Gila Bend and Casa Grande. Carefully locking up everything, I struck out on foot with a few vials, a coke and a prayer in the 104 degree heat. Within ten minutes I was picked up by some very kind Indian folks driving a perfectly heroic specimen of pickup which even I could assess as having antique value. Their most welcome lift placed me at a service station near Arizona City. While the mechanics puzzled over my car's plight, I proceeded to collect a small series of Cicindela lemniscata lemniscata (?) on the concrete driveway just outside of the garage service bay. Perhaps fearing that such behavior might pretend some far worse manifestation of instability, they sent me on my way with a valve adjustment in record time.

My camp for the hot, humid evening was at Cochise Stronghold at the foot of the Dragoon Mountains. A stop or two along the rocky road into camp proved beneficial. I could just feel in the atmosphere and from the hum of the insects around me that something of interest must be about in these parts, and it was. Proctacanthus micans was it! This catch helped me forget about my automotive woes, as I have never collected this genus of large asilid fly.

July 25, 1986

This morning I took a brief hike up Cochise trail, where I caught the Polistes-mimic asilid, Diogmites saltei, cruising above eye level along the tree lined trail. Feeding near the base of a cholla cactus was the desert longhorn Moneilema appresum, looking for all the world like a misplaced Eleodes beetle ("stinkbug" to fellow Californians). Before leaving here, I have spotted, stalked and unsuccessfully tried to net a magnificent and rare bumble bee mimic, the asilid Mallophora fulva. (Not until 1984 did I get a close look at one of these splendid beasts, when my friend Rick Villegas captured a big one only 20 yards from this same spot!)

July 26, 1982

Storm clouds surround me as I drive with haste to a favorite road stop below Roadforks, New Mexico. Luckily, the sun is still shining and I have a half an hour of favorable collecting conditions, enough time to net a big Mydas fly (Mydas ventralis), which appears to be tolerably common here, and an attractive conopid fly, Physoconops (Pachyconops) townsendi.

After sitting out a rather pleasant afternoon rainstorm by sitting under the overhang of a gigantic boulder at my campsite south of Portal, I tried my luck setting up a kerosene lantern for evening collecting. Sure enough, the blame thing caught fire, and after what seemed like an eternity (from my vantage point hiding underneath the concrete picnic table) it burned itself out. My trusty UV light saved the evening, drawing in a prionid beetle, Stenodontes (Orthomalladon) dorystomus, and the southwestern stag beetle, Pseudolucanus mazama.

July 28, 1982

Today was Pepsis day, par excellence! I took a fine series of P. f. formosa, several specimens being quite perfect and with colorful wing tomentum intact, from Asclepias a mile south of Rodeo, New Mexico. I suspect that the females were recent imagoes and had not as yet had any encounters with their tarantula hosts. Cerceris frontata, a rather grotesque, horned wasp, was attracted to the milkweed flowers too.

Though I seem to have rather mediocre luck at blacklighting, this night would be the exception. Literally hundreds of insects (mostly moths) descended upon my lone beacon in camp. The trees overhead really came alive with the sounds of flying "bugs". From the smorgasbord offered, I collected the prionids Derobrachus gemminatus gemminatus and a pair of Prionus heroicus (6cm female) and the resplendent scarab Plusiotus gloriosa.

September 4, 1982

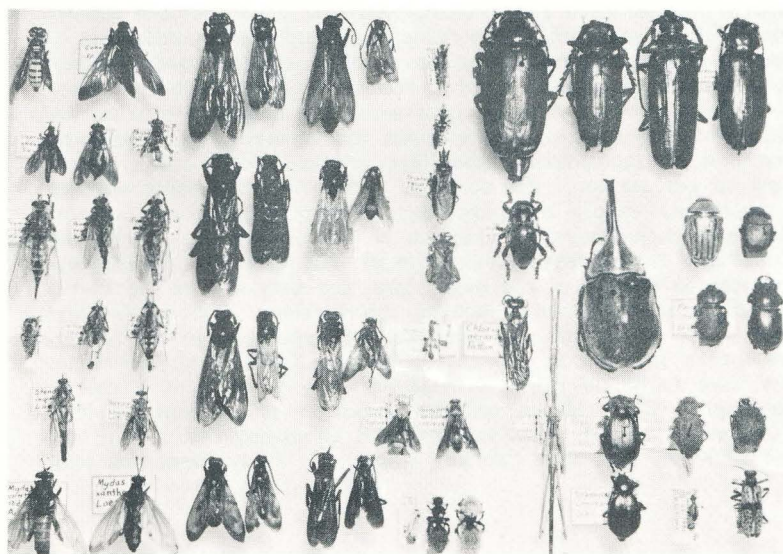
Hoping to sight another *Mallophora*, I returned to Cochise Stronghold, this time with my friend Rick Villegas. The trail yields several other asilids: *Promachus truquii*, *Efferia rapax*, *E. interrupta*, and the ubiquitous *E. albibarbis*. Several roadside stops on the Greaterville Road toward Madera Canyon produced the following: *Psorthapis portiae portiae*, a beautiful pompilid wasp decorated in velvet black and orange, and the big, black longhorn beetle *Moneilma gigas*, near the base of a cholla cactus.

September 6, 1982

Leaving Arizona is difficult to do, even when faced with the blistering desert heat, without making a collecting stop or two along the way. Just east of the rest area outside of Sentinel is a muddy wash with a good stand of *Asclepias*. From among dozens of *Pepsis pallidolimbata pallidolimbata* (the predominant species here this time) I secure a series of females. Previous stops here have yielded large numbers of *Pepsis* *thisbe* and the smaller, scarlet-winged *P. chrysothemis*. Not surprisingly, this marshy habitat supports a few little fly predators, including *Efferia rapax* and *Sarapogon bryanti*, the latter being active amongst the numerous stems of *Asclepias*.

September 11, 1983

Outside of Clear Creek Campground, east of Camp Verde, is the locale for this year's Labor Day holiday trip. Here I find my first specimens of *Promachus nigrialbus* (formerly known as *P. nigripes*) and they are abundant, warily and noisily coming to rest on and near Mesquite. I am glad to have brought my 5' net handle to break in on this trip! Two other asilids, *Ospricerus abdominalis*, and the little beekiller, *Mallophorina willistoni*, plus the walkingstick *Diapheromera arizonensis* (which I kept alive) join the catch as well. On the way home we find a large *Dynastes granti* parked under a street light in Dewey.



Survey of insect collecting in Arizona, 1982-1983, with emphasis on spider wasps (Pompilidae) and robber flies (Asilidae).

ENTOMOLOGY INFORMATION RETRIEVAL:
MAINTAINING A CARD FILE
OF LITERATURE

Gary A. Dunn
Department of Entomology
Michigan State University
East Lansing, MI 48824-1115 USA

Countless pages of entomological information are published each and every year, and it is quite a task to keep track of all the authors and dates of publication, not to mention the important information contained within the articles themselves. It pays to develop a system for keeping track of the journal articles, reprints and books in your own personal "library" as well as information on useful references you might need some day. Such a system will be invaluable when it's time to identify insect specimens, look up some life history information, or look for other information (perhaps for undertaking a research project or preparing a manuscript).

The use of a computer lends itself nicely to such cataloging. It is possible to keep track of large amounts of information in a compact, convenient, efficient manner with even a small personal computer. However, what about those people who do not own or have access to a computer? Are they doomed to frustrating searches for "lost" information? No, certainly not, because this is where a card file comes to the rescue! Even if you have plans to obtain a computer at some point in the future, maintaining a literature card file is still not be a wasted effort as it will greatly expedite the entry of data into the computer!

I have thousands of reprints, hundreds of journals, and several dozen books in my personal entomological "library" - yet I can usually find a specific article on a topic of interest to me in a matter of minutes. I do it all with a manual card file system. All that you need is a supply of 3 x 5 (or 5 x 7, if you wish) index cards, some alphabetic and/or blank tabbed cards (of the appropriate size) and a holder for the cards (metal, wood, plastic, even cardboard will do). The sooner you start your file, the better off you'll be! The longer you wait, the harder it will be to get the initial indexing done. Once you get the card file set up it only takes a hour or two each month to keep the file up to date.

Now, how to get started. Sit down at a desk or work table with a supply of the index cards, some writing instruments, and a pile of reprints, journals, or other publications. The secret to having a successful card file is the careful selection of KEY WORDS. These key words are written at the top of the index card, and they will be the words you will use later on to relocate indexed information. Choose the key words carefully; use words that you are likely to remember in the future or that have special meaning to you. Keep in mind that any given article will probably have to be described with several key words (this is called cross-referencing). Don't skimp on the selection of appropriate key words. As a general rule, I would say that just about any article can not be described with any less than two key words. In many cases you will

probably use three, or maybe even four. Do whatever you think is best. Here's an example using a hypothetical article: Doe, J. 1986 Some notes on pitfall trapping ground beetles in Michigan, with a description of a new species of Carabus (Coleoptera: Carabidae). Y.E.S. Quarterly 3(2): 1003-1014. Appropriate key words would be: "Pitfall trapping", "Michigan - Carabidae", and "Carabus species". This cross-referencing would enable you to relocate this article if you were looking for information on pitfall trapping carabid beetles, carabid beetles of Michigan, or species of the genus Carabus.

Start a card for each key word you select to describe your articles. Different articles with the same key word would be listed on the same index card. On the key word (index) card you would write the authors name, date of publication, the source of the article, and a notation on the content of the article (or even the full title of the article). For our example above, this information would be:

MICHIGAN - CARABIDAE

Doe, J. 1986 Y.E.S. Quarterly 3(2): 1003-1014 (pitfall; new Carabus)

I actually maintain three separate card files - one for literature on the Carabidae, one for the Cicindelidae, and one for miscellaneous topics. I do this for the sake of convenience and they could be easily be combined into one larger file. The files on the Carabidae and the Cicindelidae are further sub-divided alphabetically into a two files - one for articles of a general nature (biographies, collecting techniques, geographical studies, ecological studies, life cycles, behavior, etc.) and the other for articles specifically on taxonomy (tribes, genera, and species). Again, these could easily be combined into one large file (arranged alphabetically by key words), but I find it convenient to keep them separate.

Of course, all the indexing in the world won't help if your publications (reprints, booklets, journals, books, etc.) aren't stored in a logical, orderly fashion. Therefore, I keep my books shelved in alphabetical order (by author's last name), my journals shelved chronologically by volume and issue, and reprints/separates/photocopies filed alphabetically (by author's last name and then by date for each of these authors) in a file cabinet.

If you use a card file system like the one I describe here, I guarantee that you'll quickly and easily relocate those articles on your favorite entomological topics the next time you need them!



PUZZLES & GAMES

WORD FIND PUZZLE

Ten common insect orders (Lepidoptera, Hymenoptera, Orthoptera, Coleoptera, Neuroptera, Hemiptera, Thysanura, Homoptera, Odonata, and Diptera) appear in this puzzle. Words go in all directions!

NEUROPTERAOTHB
 ODONATANBQIZBG
 KXSROIQSSDOHF
 VSAADGARIA PFAB
 KPNKRQRERZHHRL
 KFSLHEEEQVAEUG
 COLEOPTERARLNQ
 AYREMPPPPPOEAAC
 DBBPOXOAOUTRSZ
 CNNHPYNKZDPEYL
 KGTRTQEDFXITHB
 ZRAYEUMYJEMPTF
 OTFYRGYYWFEIEQ
 BRCADTHWSQHDL

Puzzle by: Carey Trost
 209 N. Whitney Way
 Madison, WI 53705 USA

 See page 27

- #1 - A squash bug
 #2 - When you are hunting tiger beetles.

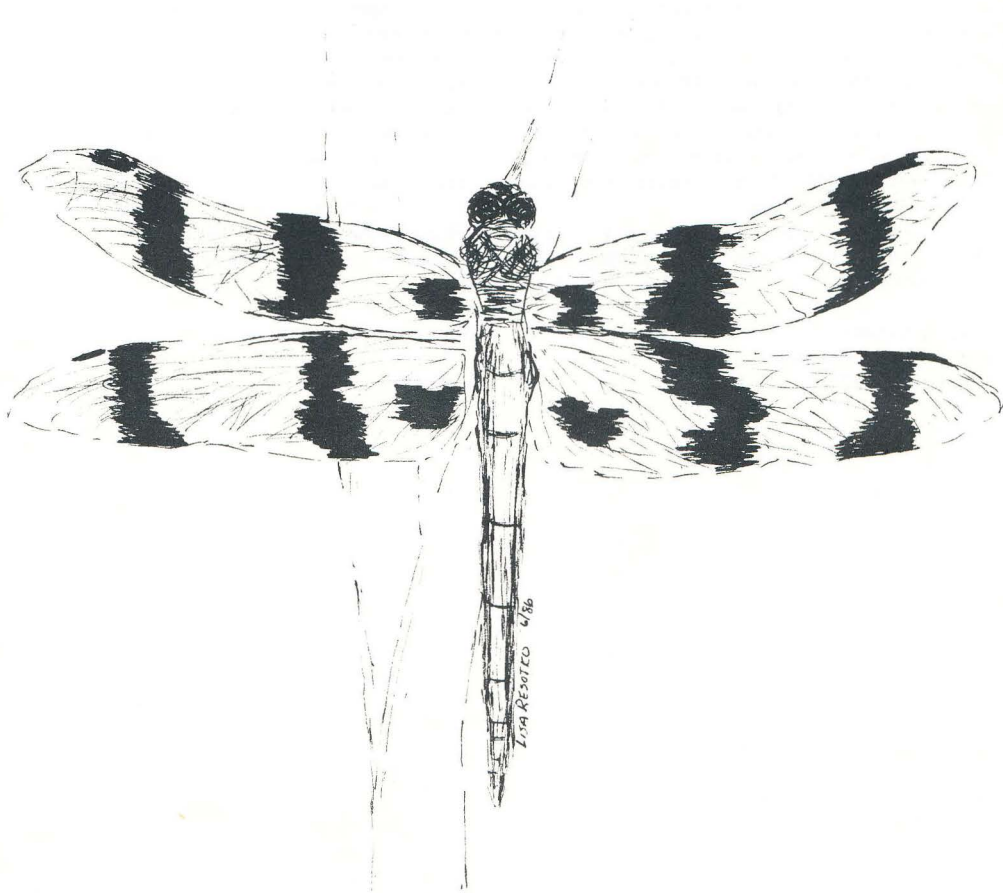
INSECT RIDDLES

(Answers can be found at the bottom of the previous page.)

There were three bugs crossing the road and one of them got run over by a truck. The other two were damsel bugs. What was the one that got run over?

When should you take your rifle with you when you go beetles hunting?

Submitted by: Bobby G. Montgomery
RR - 1
Savannah, MO 64458 USA



Brown-spotted Yellow-wing



BOOK REVIEWS

The Pleasures of Entomology. Howard E. Evans, illustrated by Peter Eades. Smithsonian Institution Press, Washington, DC, 1985, 238pp. US \$14.95.

Dr. Evan's latest work is an absolute must for any self-conscious entomologists who has ever doubted the validity of the pursuit of insects. Take heart all closet bug lovers, for entomology is not a sissy sport, and the importance of nature study cannot be understated. The author conveys this message through much more clever, vivid, and humorous prose.

The preface and the biographies of some of the early American entomologists may be the most exciting chapters in this volume. Perhaps other readers will find they share the pioneering spirit of their naturalist forefathers. Unfortunately, Evans apparently concludes that there is no place for amateurs to contribute in today's era of highly specialized sciences, a point with which this reviewer disagrees. Still, one can scarcely believe that a history lesson could be so entertaining.

Sandwiched between the preface and biographies are selected portraits of selected insects species, including fine black and white drawings by Peter Eades. Among the chosen are the boll weevil, "killer" bees, the Medfly, marsh flies, and milkweed bugs. These are fascinating stories in themselves, and Evans teases the reader with probing questions still unanswered by science.

Though the vocabulary may be a little awkward for younger readers, this delightful book is heartily recommended. Walk proud all entomophiles!

Eric R. Eaton
2310 S.W. Bertha Blvd., Apt. 5
Portland, OR 97201 USA

The Butterflies of North America. William Howe. Doubleday and Co., Inc., New York, NY. 1975 633pp

The Butterflies of North America was intended to be an updated version of Holland' Butterfly Book, which was last revised in 1931. It succeeds wonderfully in its mission, and may well be considered a definitive work on North American butterflies. It contains ninety-seven color plates of beautifully painted and remarkably detailed examples covering 2093 species and forms. The descriptive text is occasionally too technical, but this is unavoidable as the descriptions often involve subspecies, variations and the like.

Aside from being a valuable aid to identification, this book also includes a wealth of general information. There is a section on anatomy which is very interesting. Other topics covered include venation, distribution, classification, collecting techniques, and more.

The book contains a useful glossary of terms. It also has a bibliography and a cross-referenced index of foodplants and nectar sources, which makes it a significant work for rearers.

The plates are in natural color, and were hand painted by the author from actual specimens. The scientific name, collection locality, date and collection are included with each illustrated specimen. Mr. Howe has taken his sample specimens from renowned collections like the American Museum of Natural History, the Carnegie Museum of Natural History, and the Canadian National Collection, as well as many private collections. Often several illustrations are used to cover one species. The author took great care to include upper and lower surfaces, subspecies and regional variations, and seasonal forms.

There are a few drawbacks to this volume, however. Firstly, the plates are not referenced to the text, although the text is referenced to the plates. Secondly, the collection section recommends the use of cyanide as a killing agent. There are many other good choices for killing agents that do not "harden" specimens like cyanide, that it seems unnecessary to continue recommending this dangerous material.

All in all, this is an excellent and long awaited work. It is informative and comprehensive. Its size necessitates that it be hardbound, and therefore somewhat expensive, but it should prove well worth the investment to any serious collector of North American butterflies.

William O'Donnell
3849 Kenwood Dr.
Stow, OH 44224

FIRST PLACE PAPER

Y.E.S., IT'S AN INSECTS' WORLD

Benjamin Capizzo
Rt. 3, Box 217
Troup, TX 75789 USA

Insects are amazing critters. They live in every kind of environment known to man. The petroleum fly lives in pools of underground crude oil. Butterflies and mosquitoes range beyond the Arctic Circle. Some Hemiptera live at altitudes of 16,500 feet. Grasshoppers have been seen so far out at sea that land was not visible.

An insect's life span can vary from one day, as with the adult mayfly, to fifty years, as with a termite queen.

Insects make up approximately 78% of the animal kingdom. Often the number of insects found in a square mile of rural land exceeds the human population of the earth.

Insects eat nearly everything from wood to decaying animal matter. They come in many colors, sizes and shapes. They can be so tiny that they can not be seen by the human eye. One of the largest living insects is the moth Erebus agrippina, which lives in Brazil and has a wingspan of almost one foot. Insects can be beautifully colored or dressed in drab colors for camouflage. There are both social and non-social insects.

Insects are of tremendous value to the world. They are both harmful and helpful. This gives international entomology a dual role to exploit: the employment of helpful insects and the control of harmful insects.

One of the most important aspects of entomology is related to agriculture. Here insects play many important roles. Entomologists have had to study insects in order to find out how to incorporate them to benefit the farmer.

A primary role insects play in agriculture is the pollination of crops. It has been discovered that bees are ideal for this work because they seek the same plants to visit and collect pollen and nectar from. Thus they are ideal to use in monocultural farming.

Insects also improve the soil by burrowing tunnels and passageways which helps circulate air and water throughout the soil. Millions of these insects live on an acre of land. They include dung beetles, carrion beetles, ants, beetle grubs, and many more.

Some insects prey on other insects. Some of these are: praying mantids, ichneumon flies, aphid lions, and many other species of beetles, flies and wasps. The ladybug Cryptolaemus nontrouzieri was brought in from Australia in 1891 to control the citrus mealybug in California. This was one of the first times insects were massed produced to destroy insect pests. Many gardeners employ ladybugs to rid their garden of unwanted insect pests.

Insects also eat weeds and other troublesome plants. The moth Cactoblastis cactorum was introduced into Australia to destroy the overabundant prickly pear. The prickly pear has covered sixty million acres of land, making the land useless. The cactus had no natural enemies there, so this tiny moth was introduced. In seven years it had helped reclaim the land by eating the cacti.

Scientists have combated insect pests through breeding plants resistant to their infestations. One example is wheat. Wheat is highly inviting to the Hessian fly. Scientists improved the crop so that it can be planted at a time when the Hessian fly is not active.

Insects play an important role in world health. Many of them are vectors of disease. Some are used in the production of medicines. These two factors of entomology are perhaps the most important because they have a direct effect on human life. Fleas are the vectors of bubonic plague. Mosquitoes are the vectors of yellow fever, malaria, heartworms (in dogs) and many other diseases. Thanks to the work of Dr. William Crawford Gorgas, the yellow fever mosquito was controlled and the Panama Canal could be built. The tsetse fly is responsible for transmitting sleeping sickness in Africa. Flies can also be a major carrier of diseases in areas where good sanitation is not practiced. Man must control these insects in order to save human lives.

Insects used in the production of medicines include bees. A medication extracted from them is used in the treatment of hives, diphtheria, and scarlet fever. The knowledge that insects vector diseases or can be a source of medications has had a great impact on man's world.

Insects cause other problems. Cockroaches invade our houses. Termites destroy our buildings. Insects like the spruce budworm and the southern pine beetle attack and destroy our forests. Aphids, Colorado potato beetles, squash bugs and cutworms, to name a few, attack our gardens. Fire ants swarm across our land. (Quarantines have been placed on hay and wood in parts of east Texas, in order to control this fiery little creature.) We must continually work on discovering new and better ways to control insect pests.

Insect are also very enjoyable. The study of their habits, habitats, and life cycles are incredibly fascinating. I will list just a few: ants capturing and "milking" aphids for their honeydew, soldier ants capturing other ants and making them slaves, dragonflies flying at speeds of 24 to 35 miles per hour, and bombardier beetles emitting a poisonous smoke screen to elude their enemies.

Man has also found uses for products made by insects. Some of these items are dyes, wax for candles, lipsticks and crayons, high-quality ink, silk, and honey.

Man must be very careful with the world of insects, for every insect has an importance. Entomologists must study and look for their importance, as all insects must have been created for a reason and only our study of them will find the reasons.

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SECOND PLACE PAPER

Y.E.S., IT'S A WORLD OF INSECTS.

Mark Yokoyama
1825 N.W. Grant Ave.
Corvallis, OR 97330 USA

Well, is it? Yes, insects play an important role in your life. You may not think about it, but you probably saw a tree today. Well, without insects, there would be very little pollination and trees, plants and shrubs could not reproduce. Maybe you ate some fruit today. If we didn't have insects, flowers wouldn't be pollinated and the fruit wouldn't form.

Silk is made from caterpillar cocoons, and honey is taken from honey bees. These are two beneficial contributions of insects. Cochineal, a natural dye, obtained from the bodies of a scale insect (*Coccus cacti*) is used by people in Mexico and Central America to produce the beautiful red color used in their textiles. Insects are helpful to man in many ways, but some cause problems.

Some insects are real killers. One example is the famous "killer bee" which was brought from Africa to Brazil to be used in research. The "killer bees" were accidentally set loose and have spread northward, killing people and animals in their path. In the tropics, mosquitoes have long been a problem to man because they carry diseases like yellow fever and malaria. Possibly the worst killers of all were the oriental rat fleas that carried the bubonic plague in Europe, and killed about one-fourth of the population during that time. Even today, the tsetse fly carries sleeping sickness to humans in Africa. It also carries another disease to cattle called nagana. So far, even with modern technology, we have not been able to control this insect.

Another group of insects may not kill man directly, but can cause food problems. These are the crop pests. Locusts ruin large fields of crops in hours and travel across the country at an alarming rate of speed. The gypsy moth came to the United States from Europe, escaping from a laboratory in the east, and feeding on trees. Because it did not have the natural enemies in America that it had in Europe, it became a serious forest pest. This year, my home state of Oregon will spend large amounts of money to prevent defoliation of trees that are important to our timber industry.

International entomology groups are beginning to track insect pests. They are holding conferences about problems like killer bee migration and locusts. They are also studying insect problems carefully before taking measures like using insecticides. Ecosystems are highly complicated and solutions to one problem may cause many more problems. Communications between scientists from one country to another is needed so habitat destruction can be kept to a minimum and workable solutions to problems can be shared. Warning systems should be developed to use from one country to another about spread of harmful insects and countries should take responsibility for this spread.

International entomology is important because insects play an important role in the world and are a world-wide concern.

THIRD PLACE PAPER

Y.E.S., IT'S A WORLD OF INSECTS

Michelle Yokoyama
1825 N.W. Grant Ave.
Corvallis, OR 97330 USA

International entomology is very important for our world today. There are several reasons why scientists around the world need to study insects. The first reason is to make sure that none of our insects become extinct. It is sad when an insect becomes extinct because people who want to see one of a certain species can't ever see one again.

Another reason for entomologists to study and communicate about insects around the world is because some countries have helpful insects that may need to be sent to other countries. For example, some places may need honey bees to help pollinate their crops. Maybe America can send them some honey bees.

It can be a very big problem if some countries allow harmful insects to travel on boats and airplanes to other countries that don't want those insects. For example, the gypsy moth came to America in 1869 from Europe. Once in America it escaped from a laboratory and started attacking trees on the East Coast. Now my home state of Oregon has spent a lot of money trying to kill the gypsy moths who travel here on peoples' cars and lawn furniture when they move to Oregon. If we don't kill them, they may ruin many of our beautiful trees.

So, I think the scientists from all around the world need to communicate about harmful and helpful insects.

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UNUSUAL ASPECTS OF THE LIFE CYCLE OF SATURNIID MOTHS

Gary J. Lovell
3818 Watson Street
Toledo, OH 43613 USA

During the past 15 years I have collected, raised and observed several species of saturniids (giant silk moths). Many people are already familiar with their life cycle, so I would like to focus on some interesting aspects I have encountered while observing the short-lived adult stage. One of the most intriguing aspects of behavior involves the assembly of males.

In North America there are many Saturniinae, but the species I have concentrated on are Hyalophora cecropia, Antheraea polyphemus, Callosamia promethea, and Actias luna. The first two are very common in the Toledo (Ohio) area and the cocoons are easily obtained. The latter two are less common. The cocoon of A. luna is found on the ground and it is virtually impossible to find. In order to study the Luna I found it necessary to purchase cocoons from a biological supply house, then mate the adults and rear the larvae.

If you are going to assemble moths, the first thing you must have is a freshly emerged female of the desired species. Place the moth in a cage with adequate ventilation. Sometimes I place the female directly in the cage; other times I let it emerge from the cocoon in the cage so I don't have to disturb it.

The time period during which a female moth releases pheromone (or "scent") varies with the species. The four species I mentioned run the spectrum from 7:00 p.m. to 6:00 a.m. EDT (Eastern Daylight Savings Time). However, the time the female releases her pheromone and the time the first males begin to arrive are not necessarily the same. The promethea releases pheromone between 7:00 p.m. and dark; the luna about 11:00 - 12:00 p.m.; the polyphemus between 2:00 and 4:00 a.m.; and, the cecropia between 4:00 a.m. and dawn.

I have gotten up many nights at the proper time to observe the results. I would almost always be surprised. Sometimes I would have more specimens than I could handle, and other times there would be none. The number of males attracted depends on such things as weather and population distribution. One thing I've noticed about the cecropia female is that she may not release her pheromone on the first night if she is small in size.

If undisturbed, the females are usually content to sit quietly until after mating. Sometimes if I'm short of females I let her attract males, but I keep her isolated so that she is not mated. This way I can extend my experiments over several days or until the next female emerges.

My first surprise observation was in 1970 when a friend's cecropia female attracted 10 males in a single night. We only expected one or two! But as long as you protect the female from potential mates she will continue to release pheromone until the end of the species pheromone period. In the meantime, every male within range of the pheromone will probably find his way to the female. Of course, under natural conditions that probably won't happen because the first male to arrive will mate with the female.

Originally we thought that ten males was phenomenal. But on several other occasions that year we attracted up to 25 males. On June 30, 1974, with 4 females producing pheromone, we broke our previous record. From my notes: "males started coming before 4:00 a.m. and continued until 5:30 a.m. We surpassed the record before 5:00 a.m., and reached 45 by 5:31 a.m. (EDT)." In 1979 I was able to record new records of 47 and then 48 males (in one night). The most incredible night occurred in 1980, on June 26: "6:00 a.m. (EDT) — 111 male cecropia moths attracted to two females. Caught as many as I could, but saw at least 2 others I could not catch. An unbelievable number for me to grasp. Starting about 4:40 until 5:45 a.m.." Neither my friends nor I have ever seen a night like that one since!

One of the experiments I do with these males is to mark them with paints and set them free after mating with the female, or the next evening. I mark them with different colors so that I can differentiate between different release days. The results have been variable and are somewhat dependent on the number caught and released, but this past year I got 3 out of 5 (60%) to return. Our usual return rate is 10%. For example, one day in 1974 I attracted 20 males and only 2 were marked. All the rest were new.

Through the use of different colored markings I have discovered that some male moths come back night after night. And, several have skipped a night and then come back the next night. One even came back after a four day absence. Some have come from different locations.

An example of a large number of returned males with different markings came on the day after the 111 specimens were attracted. I released 105 of them marked with red paint. On the 27th of June (1980) a friend and I caught only 91 males. From my notes: "Had a big turnout of marked ones. Most marked ones were red from June 26 evening... Five were red and yellow ones from earlier release... total of 35 were marked."

From these different groups one can see a cross section of large, small, new or battered individuals. A sample of the composition comes from the 111 specimens of June 26 (1980): "Besides large and small, there was another badly tattered one... Several had holes pecked in their rear eyespot as if birds had attempted to eat them. Most were perfect, and a few had small chips off wings."

Another thing I've noticed about male cecropia moths is that the hair on the last abdominal segment near the reproductive organs gets worn off during mating. If this is a reliable indicator of mating activity, then I can say that both mated and unmated males will come to waiting females. With the Lunas I had last summer, two males mated twice with different females. However, half of all eggs from the four females did not hatch, indicating, perhaps, that the males spent themselves on the first female.

Polyphemus moths are very sensitive to disturbances, and the pheromone seems not to spread great distances with the result being that we rarely get more than one or two males, if at all. At Mud Lake in the Irish Hills of Michigan, we once got 9 males in a single night. *Promethea* is easy to handle, but their usual habitat is even further away so the most we have gotten is 2 males.

I've had no experience attracting Luna moths. Last year I purchased some cocoons and the adults easily mated in a cage after nightfall. This generally does not work for the polyphemus and cecropia because their pheromone period is much later and the males want to fly as soon as it is dark. Hence they could be tired and their wings could be torn to shreds by the time the female is ready.

I have kept a daily record of the emergence of our captive cocoons since 1971. I recorded the sex and number of each species that emerged daily. Some years we collected more than others, with a range of 72 (1983) to 8 (1984) and an average of 40 per year. The earliest emergence date in the Toledo (Ohio) area was May 16. The season lasts about 6 to 8 weeks and ends around the second week of July. Antheraea polyphemus adults emerge from about June 1 to July 25th. Our local promethea (one brood I believe) emerge in early to mid July. The only twelve Luna cocoons I had (from a supply house in the southern United States) all hatched during the third week of May. The second brood of six hatched during the last week of July.

In a typical year, the peak of the season (which I determine by the day most of my cocoons emerge, and which I assume is proportionate to the "wild" cocoons) is close to the same date each year. According to my notes, the cecropia peak is during the third week of June: June 19, 24 and 28 coming up several times each. The highest number that emerged in one day is 9, with an average of 4 to 5. In 1975 and 1976 my records show an especially early emergence for the cecropia, probably due to a large number of captive-raised caterpillars. All of the captive-raised cocoons hatched earlier for reasons not yet clear to me.

After the moth mating season is over, I attempt to raise the larvae for experiments in the following year.

As you can see from this discussion, the saturniids demonstrate a wide variety of behavior and activity patterns which makes them all the more interesting. If anyone has had similar (or different) experience with these moths, I hope they will publish the information in Y.E.S. and/or write to me.

GOLDENRODS AND THE SHOWY LOCUST BORER BEETLE

Patricia Purdy
303 Elm Street
Salem, VA 24153 USA

On warm, pretty days in late summer and early fall the sight of locust borer beetles on yellow goldenrods is beautiful. The adult locust borer (*Megacyllene robiniae* (Forster)) makes its appearance as soon as goldenrods (*Solidago*) begin to bloom. This is usually from August through the early part of October in our area (Virginia, USA).

Goldenrods are one of the best flowering plants when it comes to collecting and observing insects. It is amazing to see the number and variety of insects which visit the goldenrod blossoms. Perhaps one of the showiest insects among these are the locust borer beetles. This beetle is exceedingly common on goldenrod in the fall.

The familiar goldenrods occur in a variety of habitats. Most species have yellow flowers, but a white species is also known. Goldenrods are easy to distinguish from other kinds of flowers; but distinguishing between the various species of goldenrods is difficult because there are many similar species and they often hybridize.

The locust borer beetle is a handsome black beetles with bold yellow oblique bars across the entire upper side of the body. One of the yellow bars, approximately midway down the length of the body, forms a distinctive "W" shape. The legs are reddish brown, and the antennae are long and black. There is another beetle species that is very similar to this beetle. It is the painted hickory borer, *Megacyllene caryae* (Gahan). The two species are nearly identical in appearance, but *M. caryae* lacks the distinctive "W" shape and the underside has lesser amounts of yellow pubescence.

The adult locust borer eats the pollen and nectar of goldenrods. Several beetles may be found occupying a single flower plume, and sometimes pairs may be observed mating while on the blossoms. This black and yellow beetle blends well with the yellow background color of the goldenrods. It is believed that they gain certain protection from their enemies through this camouflage.

Although adult locust borers cause no apparent harm to the goldenrod blossoms, unfortunately, the larval stage of this beetle is known to be a serious pest of black locust trees (*Robinia pseudoacacia*). The female beetle deposits eggs into pits cut into the bark and the hatching larvae bore inward, feeding on the sapwood. The larvae hibernate through the winter, resume feeding in the spring, pupate under the bark in late spring, and emerge as adults the following August (at about the same time the goldenrods are in bloom). Even though the larvae of the locust borer may sometimes cause damage to locust trees, we can still appreciate the enhancement of beauty which these beetles so greatly add to the goldenrods on fall days.

The best way to explore the goldenrod insect fauna is with a net and a good hand lens. Capture a locust borer beetle, either by hand or with

your net, and closely examine its body structure and bold colors using a 10X or 20X hand lens. While you're at it, take a closer look at the small florets of the goldenrod blossoms. You might want to collect and examine other insects which are also visiting the blossoms of goldenrod. Inspect the goldenrod plumes carefully and you may discover other insects and spiders hiding among the florets. You may discover ambush bugs (Phymata spp.) and flower spiders (Misumena vatia) which prey on other insects that come to feed on goldenrod nectar and pollen. Many rewarding hours can be spent observing the insects and other animals that visit flowering plants such as the goldenrod.

(Editor's Note: You may want to keep a checklist of insect species you find associated with various flowering plants in your area. Later, you may want to observe specific insects more closely, to watch their behavior at the flowers. You may be able to find the answers to questions such as "How long do particular insects remain at the blossoms?", "Is there any aggressive behavior between different species of insects?" or "Are insects attracted to specific parts of the plant, i.e. the top, the bottom, etc.?" There is no end to the exciting projects you could do if you are interested in insect-flower interrelationships.)

PRESERVING AND STORING COLEOPTERA

Bobby G. Montgomery
RR-1
Savannah, MO 64485 USA

We all know what a problem it is storing and preserving specimens that have not been mounted and dried. I would like to describe a method which is ideal for preserving and storing specimens until you can find time to mount and put them in your collection. It is also a great way to ship specimens to other collectors or for use in the Y.E.S. Swap Box program. I have been experimenting with this process since the spring of 1986, and the first specimens stored this way are still fresh and ready to mount with no further relaxing.

The first thing you will need is a storage envelope. I use a piece of paper 8.5 inches long and 5.5 inches wide. Actually, any size will do, and you can adjust the size according to your particular needs. Fold the paper in thirds lengthwise, and then crosswise in thirds. I usually fold a supply of these storage envelopes in advance and keep them secured with rubber bands in bundles of 20 until I need them.

Next you need a relaxing fluid. I use the formula given in Dillon and Dillon (1972), "A Manual of Common Beetles of Eastern North America". It is made by mixing 53 parts ethyl alcohol (95% denatured can be used, as long as it is ethyl), 49 parts water, 19 parts ethyl acetate, and 7 parts benzene by volume.

You will also need a box of plastic "cling" wrap, cotton batting, PDB (paradichlorobenzene), and a storage bottle with a tight-fitting lid.

Now you are ready to preserve and store specimens. Drop a specimen in the relaxing fluid. Take the envelope and write or type all of the appropriate data (date, locality, habitat and collector) on one end of the envelope. The reason for writing the information on the end and not on the middle of the paper is that the relaxing fluid will run most inks, even India ink if it has been subjected to freezing temperatures at one time or another. Open the envelope and cut a piece of the cotton batting so that it will fit in the middle section. Cotton batting can be split into two separate layers very easily, so separate the layers and place one of the layers in the middle of the envelope. Remove the specimen(s) from the relaxing fluid and place one (or more) on the cotton batting. Place the other half of the cotton on the specimen(s) and fold the envelope back up. Fold the end without the written information into a point and tuck this into the other end. Tear off a 6 to 8 inch piece of the plastic wrap and wrap the envelope in it. Fold the wrap so as not to obscure the written information; this way you can read it with out having to unwrap the specimen.

Now place some PDB crystals in your storage bottle, put in the envelopes, and seal tightly. I use coffee jars and gallon bottles as my storage bottles. If a bottle does not seal very tightly, you will have to check it from time to time to know whether or not the PDB crystals need to be replenished.

I intend to keep some of the first specimens I have in storage preserved in this manner for a long while, this way I can check them periodically and report to the readers of *Y.E.S. Quarterly* of any difficulties I encounter. At the present time I have over 1000 specimens stored this way, a nice thing to have when "old man winter" comes along!

DATA LABELS FOR INSECTS

Bobby G. Montgomery

RR-1

Savannah, MO 64485 USA

You might be surprised to find out how many insect specimens there are in museum collections with dates that can not be accurately determined. In many instances the age of the paper is the only clue to determining the date of collection for the specimen!

One problem with dates on insect labels is the exclusive use of Arabic numerals. If we see a label with "9-11-1972", what date is really indicated? Is it 9-November-1972, or 11-September-1972? There are two possible ways to overcome this problem. One way is to use Roman numerals to indicate the month. Thus, September 11, 1972 becomes 11-ix-1972 OR ix-11-1972. Some people are not accustomed to using Roman numerals and it may be too easy to create errors by inadvertently using the wrong Roman numeral. The other method, and the one that I prefer, is to use the alphabetic abbreviation for the month placed between day and the year (e.g. day-month-year). To go back to our example, it would look like this: "11 Sept 1972".

Remember, a complete data label has more than a date on it. It must also have concise information on the collection locality (country, state/province, county/district, and nearest town or distinctive geographical feature). I use separate labels for locality data and date and collector data (see figure 1a and 1b).

The thorough collector also uses labels for bionomic information such as food plants, host information, rearing and emergence information, habitat type, mating activity, etc. An example of a "bionomics" label is given in figure 1c. Both my father, Roy O. Kendall - a Lepidopterist with 35 years experience -- and I put a blue border around our "bionomics" label. We do this because it makes them easier to spot in a collection of pinned specimens.

My dad is the source for most of this information. I have found this information to be very valuable in having an informative, well-organized, valuable collection, one that I can be proud of now and in the future. Of course many people will have a few of their own special variations when it comes to labelling (this is fine), but we must all strive to make labels consistent within our own collections, and we must be sure they contain all of the necessary scientific information that make insect specimens valuable.

I have also experimented with making labels by copy machine reduction. I was excited about the possibility of having my labels reduced to a nice size at a reasonable expense. Things didn't work out the way I had hoped though! Three-quarters of my labels turned out unacceptable because they were either too dark, too light, or illegible because the letters "bled" into each other. I have tried two different machines at two different copy shops, and they still came out the same. Maybe in years to come the technology will be improved so that any copier is capable of making quality insect labels.

At the present time I am using an IBM Actionwriter 1 typewriter to prepare my labels. I set the pitch (the spacing between the letters) at 15 and when I return the carriage I use "paper down (micro)" three times each line. This puts each line up next to previous line. I use a maximum of four lines per label and 19 characters across. This produces a finished label that is 12 mm (wide) by 33 mm (long). See figure 2 for an example of this type of label.

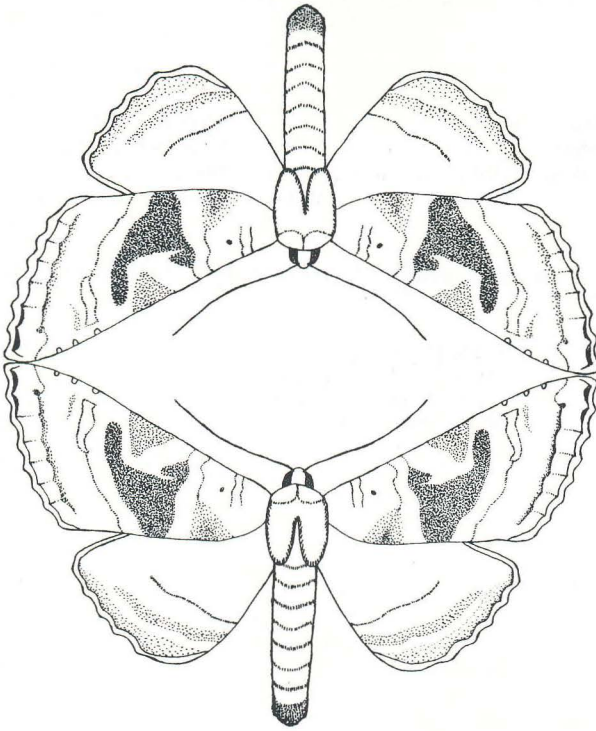
And finally, a word about selecting paper for your labels. Use the heaviest high rag-content paper you can get. This paper will not yellow and deteriorate over the years and your labels will be around (and legible) for many years to come.

Figure 1: (a) locality label, (b) date and collector label, (c) "bionomics" label.

(a)	(b)	(c)
MISSOURI: Andrew County, Montgomery mini farm;ca 4 a/mi NW of Savannah	coll: 19 Bobby G. Montgomery Diane S. Montgomery	Larval food: Elderberry (Sam- bucus canadensis) (boring in stem)

Figure 2: Example of a label produced with an IBM Actionwriter 1.

MISSOURI: Andrew
county, Montgomery
mini farm:ca 4 a/mi
NW of Savannah



Phlogophora periculosa

AS

Illustration by: Sue Andres-Seabolt



TRADINGPOST

Wanted: Wings from a wide variety of flying insects for use in macro photography work (see YES QUARTERLY 3(2): 40-41). I can use whole insects, even with damaged bodies, antennae, etc., or just wings. I am a naturalist and not an entomologist, so any help would be greatly appreciated! Contact Helmuth Schulz, Jr. 1582 US 131, Petsokey, MI 49770 USA. (3/4)

Wanted: Persons interested in exchanging specimens of *Carabus*, *Calosoma*, and *Ceroglossus*, worldwide, but especially North America. I can offer many European and Turkish species. Write to Carl L. Blumenthal, Kiefemstr. 21, D-5210 Troisdorf, WEST GERMANY. (3/4)

For Sale: Dried specimens of Philippine insects; also other natural history specimens such as bird skins, mammal skins, prepared microscope slides, preserved marine invertebrates, etc. Please contact Julio M. Mirafuente, General Manager, Star Biological Supplies, Boac, Marinduque, PHILIPPINES. (3/4)

Exchange Wanted: I have many insects (especially Coleoptera) available from Trinidad, Venezuela, Europe and southwestern U.S., for Carabidae and Cicindelidae of the world. Especially interested in obtaining Australian, Asian and African species. All letters answered. John Hutchings, Dept. of Biology, California State University, Long Beach, CA 90840 USA. (3/4)

For Sale: Insects (especially butterflies, moths, beetles, hoppers, and stick insects) of Malaysia. Catalog - US \$2.00. Contact Kee Choe Gooi, 70 Jalan Foo Win Yin, Canning Garden, 31400 Ipoh, MALAYSIA. (3/4)

For Sale: Approx. 500 species of Coleoptera: Cerambycidae, Carabidae, Buprestidae, Tenebrionidae, and Cetoniidae. Free list. Prefer to exchange. Contact Dr. Diethard Dauber, Neubauzeile 78, A-4020 Linz, AUSTRIA. (3/4)

Free Publication Available: "Insect Rearing" by Pritam Singh, DSIR Alpha Publication #53 (March 1986). Any one interested in insect rearing will want a copy of this 4pp bulletin. Send requests to: Publication Officer, Science Information Publishing Centre, DSIR, P.O. Box 9741, Wellington, NEW ZEALAND. (3/4)

More Publications Available: "A Catalog of the Coleoptera of America North of Mexico, Family.....": Anobiidae, Amphizoidae, Cerylonidae, Ciidae, Dryopidae, Cupedidae, Curculionidae (Curculioninae), Elmidae, Heteroceridae, Languridae, Limnichidae, Micromalthidae, Micropeplidae, Platypodidae, Psephenidae, Pyrochroidae, Rhysodidae, and Scarabaeidae (Geotrupinae). Published by the USDA Systematic Entomology Lab and distributed by the Coleopterists Society. Send requests to Gary A. Dunn, Dept. of Entomology, Michigan State University, East Lansing, MI 48824-1115 USA. (3/4)

For Sale: Quality greeting cards for entomologists - design on cover of Spring 1986 Y.E.S. QUARTERLY - other designs to be available soon. Contact Todd Lawton, 29-61 Furby, Winnipeg, Manitoba, R3C 2A2 CANADA. (3/4)

For Sale or Exchange: North American Cicindelidae. Will also trade other Coleoptera for Cicindelidae. Contact Todd Lawton, 29-61 Furby, Winnipeg, Manitoba, R3C 2A2 CANADA. (3/4)

For Sale or Exchange: Large supply of live pupae of Catalpa hornworm (Ceratomia catalpae) and black swallowtail (Papilio polyxenes). Prefer to exchange. Call or write: David C. Patten, General Delivery, Peace Valley, MO 65788 USA, (417) 277-5836. (3/4)

Wanted: Live ovae of the Io, Luna, cecropia, Cynthia and promethea moths. Prefer to exchange, if possible (see previous ad). Contact: David C. Patten, General Delivery, Peace Valley, MO 65788 USA, (417) 277-5836. (3/4)

Wanted: Letterheads that use insects as a part of the design. I am trying to put together an interesting cover for a future issue of Y.E.S. QUARTERLY. Anything would help (but don't send the Y.E.S. logo)! David C. Patten, General Delivery, Peace Valley, MO 65788 USA (3/4)

Wanted: Correspondents interested in scorpions, large spiders, and mantids for use as specimens or pets. Also, those interested in collecting Coleoptera, especially Tenebrionidae, Scarabaeidae, Cerambycidae, and Carabidae, and rearing and medical entomology. Contact Keith Dabney, 702 Haight Ave., San Francisco, CA 94117 USA. (3/4)

Exchange: Cicada skins from New York (USA). Beginning collector will trade for any interesting specimens. All letters answered. Joseph Glendinning (age 8), 2654 Linden, East Lansing, MI 48823 USA (3/4)

For Sale: Excellent quality insect mounting pins including std. black, elephant, stainless steel. Best prices available. Also offering the most popular books and supplies. Worldwide butterflies, moths and beetles in all price ranges. Personalized service to the novice and seasoned collector. Featuring "The Illustrated Encyclopedia of the Butterfly World in Color". Specializing in Papilio, Morpho and Heliconius. Send US \$5.00 for subscription to price lists to Ianni Butterfly Enterprises, P.O. Box 81171, Cleveland, OH 44181 USA. (3/4)

For Sale: Beautiful woven cloth banner - yellow and 6 x 9 inches. Features the logo of the Universidad Nacional Experimental del Tachira (Venezuela), a large cerambycid beetle Stenodontes molarius Bates (in black) with green U.N.E.T. letters. Only US \$2.00. Send orders to Daniela Havranek, U.N.E.T., Apartado 436, San Cristobal, Tachira, VENEZUELA, S.A. (3/4)

Wanted: I would like to obtain a copy of O'Brien, C.W. and G.J. Wibmer, 1986 "Annotated checklist of the weevils (Curculionidae sensu lato) of South America" (Mem. Amer. Ent. Inst., 39) in exchange for a copy of Louw, S. 1986 "Revision of the Microcerinae (Coleoptera: Curculionidae) with an analysis of their phylogeny and zoogeography (Mem. nas. Mus., Bloemfontein 22: 1-331). Contact A. Rensburg, P.O. Box 266, Bloemfontein 9300, SOUTH AFRICA. (3/4)

Correspondence Wanted: I am interested in making contact with members with an interest in tarantulas, with a view to exchanging and buying live specimens and exchanging information. Ronald N. Baxter, 45 Chudleigh Crescent, Ilford, Essex, IG3 9AT, ENGLAND. (3/3)

Wanted: Looking for a used (or mint) copy of Hatch (1953), The Beetles of the Pacific Northwest; Darlington (1952), The Carabid Beetles of New Guinea, Part 1 AND Part 2 (Agoniini). Send condition and price to Yves Bousquet, BioSystematics Research Institute, Agriculture Canada, Ottawa, Ontario, K1A 0C6 CANADA. (3/3)

Wanted: Pupae and/or cocoons for a live mini-insect zoo exhibit at the Hicksville-Gregory Museum (NY). Donations gladly accepted, will purchase if necessary. J. Scancarelli, Director, Hicksville-Gregory Museum, Heitz Place, Hicksville, NY 11801 USA. (3/3)

Wanted: North American and worldwide robber flies (Diptera: Asilidae). Can send many Italian species of beetles and other orders of insects in exchange. All correspondence welcomed! Cesare Iacovone, Via G. Noventa No. 12, Scala I - int. 3, 00143 Roma, ITALY. (3/3)

Wanted: Less common North American Saturniidae (specimens or live ovae) with data. Any Sphingidae, also. Send offers to Eric Olson, 5117 Flad Ave., Madison, WI 53711 USA. All letters answered. (3/3)

Bird Watchers - Butterfly Collectors: Visit Costa Rica! Over 800 species of birds and 1500 species of butterflies abound throughout the country. Low, fully-inclusive prices, 2-6 persons per group. Write for details, stating interests. TRANSWORLD (yes) Apartado 7911, San Jose, COSTA RICA, C. America. (3/3)

For Sale: Fossiliferous Mazon Creek iron nodules of Pennsylvanian period. Plants and some invertebrates need a good home. All much below retail, buyer responsible for postage. Send self-addressed, stamped envelope for price list. Donald Baumgartner, 150 S. Walnut St., Palatine, IL 60067 USA. (3/3)

Collecting Safari: The tropical rain forests of the world are being destroyed at a rate of twenty million hectares per year (an area about the size of Alaska). Experience the splendor and beauty of these jungles while they are still with us. We offer some of the finest organized safaris available. Your vacation and collecting trip in one package! For brochures and information contact Darien Compound Safaris, Special Tours and Travel, P.O. Box 909, Panama 9A, PANAMA Tel. 55-7272 (3/3)

Will Trade: A Field Guide to the MOTHS of Eastern North America by Charles V. Covell, Jr. (hardbound and like new - used three times). Will trade for publications on CVoleoptera or a reasonable number of cerambycid (long-horned) beetles. All letters answered. Bobby Montgomery, RR - 1, Savannah, MO 64485 USA. (3/3)

For Sale or Trade: Megarhyssa aterata (Hymenoptera) and its host Tremex columba (Hymenoptera) (adults and immatures of both). In all there are 41 8-dram vials with approx. 55 specimens preserved in 190 proof alcohol. The specimens were collected in Missouri, and I will include 4+ pages of field notes in additiona to the usual collection data. Will sell for US \$50.00 or trade for publications on Coleoptera or for specimens of Cerambycidae. All letters answered. Bobby Montgomery, RR - 1, Savannah, MO 64485 USA. (3/3)

New Fall Catalog!: Illustrated, expanded catalog. Species from South and Central America, Africa, Indonesia, Europe, etc. Specialists in Morpho and Parnassius subspecies (request special listing). Prompt delivery, top quality. Send US \$1 for catalog or \$6 for monthly lists/catalogs for 1 year. Transworld Butterfly Co. (YES), Apartado 7911, San Jose, COSTA RICA, C. America. (3/3)

For Sale or Exchange: Giant flower-loving flies (genus Rhaphiomidas), various species, size 20 - 30+ mm. Also, Mydas fly (Neomydas pantherinus). Many other large, rare Diptera from western USA, some with empty (but perfect) pupal case. S.A.S.E. for prices. Will exchange for other large Diptera (20 mm & up) worldwide. Contact: Rick Rogers, 2630 Palm Drive, Hermosa Beach, CA 90254 USA. (3/2)

For Sale: Worldwide distributor of superior quality entomological supplies books and living material. Send US \$1.00 for catalog. We specialize in prompt, courteous service. American Biological Supply Co., 1330 Dillon Heights Ave., Baltimore, MD 21228 USA. Phone (301) 747-4500 (3/2)

Wanted: Coccinellidae, worldwide. Will purchase or exchange. Send offer to: Francesco Isgro, 2002 Wellfleet Court, Falls Church, VA 22043 USA (3/2)

For Sale or Exchange: Black-winged damselflies, Calypteryx maculata (males and females) with complete data. Interested in offers from anywhere in world. Contact: David C. Patten, General Delivery, Peace Valley, MO 65788 USA All letters answered. (3/2)

Wanted: Male and female specimen of the black witch (giant noctuid). This species is primarily tropical but does wander north to Canada; it is a pest in Hawaii. Write to: David C. Patten, General Delivery, Peace Valley, MO 65788 USA (3/2)

For Sale: Many kinds of insects, for scientific studies or just for collections; named or unnamed, lots or single specimens, pinned and labelled or papered. Collections are named, pinned and labelled. WANTED: Tenebrionidae from arid areas of South America (only) such as: Patagonia, high Andes ranges, etc. EXPEDITIONS: to any area of South America to collect, study or photograph insects. Vacancies for two people and gear in a camper. 40 years experience. Send inquiries to: Luis E. Pena G. P.O. Box 2974, Santiago, CHILE. (3/2)

For Sale: Formosan butterflies, moths, beetles and other dried insects. Also, live cocoons and ova of moths. Write to: P.T. Chang, P.O. Box 873, Taipei, Taiwan, REPUBLIC OF CHINA. (3/2)

For Sale: Worldwide Lepidoptera, also some Coleoptera. Top quality papered specimens, with complete data. Good prices. Satisfaction guaranteed. Also for sale: Elephant-brand insect pins, and the books "The Illustrated Encyclopedia of the Butterfly World" by Smart and "Butterflies of the World" by Lewis. Send US \$1 and legal size SASE for pricelist. Your \$1 refunded with first order. Thomas Greager, R.D. #6, Box 56-B, Greensburg, PA 15601 USA. (3/2)

Wanted: Copies of the books: "Mosquitoes - Their Bionomics and Relation to Disease" by W. Horsfall (1955); "Myiasis in Man and Animals of the Old World" by F. Zumpt (1965); and "The Mosquitoes of Canada" by D.M. Wood et al. (1979). Will pay a reasonable price and shipping costs. Donald Baumgartner, 150 S. Walnut St., Palatine, IL 60067 USA (3/2)

Wanted: Markets for informative articles on insects and spiders, illustrations, and editorials on wildlife and environmental issues. Cartoons, too. Eric R. Eaton, 2310 S.W. Bertha Blvd. Apt. 5, Portland, OR 97201 USA. (3/2)

For Sale: All papered Central and South American Prepona. A wide selection. Also sell African Charaxes and various Neotropical butterflies and large and medium Dynastinae. For a free list, write to: Mark Khun, 1245 Conway Lane, Reno, NV 89503 USA (3/2)

Publications for Exchange: I have a large number of duplicate reprints and photocopies of articles on Coleoptera (mostly Carabidae and Cicindelidae) which I would rather not throw away - they need a good home! I would be willing to accept any reasonable offer of specimens (Carabidae or Cicindelidae) or other literature. A free list is available upon request. Gary A. Dunn, Department of Entomology, Michigan State University, East Lansing, MI 48824-1115 USA. (3/2)

For Sale or Exchange: All orders of insects from Israel, especially Diptera and Hemiptera. Write for details. Izhak Nussbaum, Nahalat zvi 35, Petach-Tikva 49421, ISRAEL. (2/4)

For Sale: Many butterflies, beetles and other insects from all parts of the world. Write for main list and supplementary list every month. FOR EXCHANGE--same for many rarest insects and others. Send your offer. WANTED--all information regarding breeding of Goliathinae, Dynastinae and other Scarabaeidae. Also, we research living material like Dynastes hercules, neptunus, megasoma, Goliathus, etc. Gerald Pelissie, "Les Granges Noires", 01660 Chaveyrait, FRANCE. (2/4)

For Sale: Worldwide collectible butterflies, beetles and rare insects, names with data. For subscription to butterfly and beetle price lists send \$5.00 to Ianni Butterfly Enterprises. P.O. Box 81171, Cleveland, OH 44181 U.S.A. (2/4)

For Sale: Neotropical insects from northern Central America, or will **Exchange** same for *Catocala* (Lepidoptera: Noctuidae) especially from Europe, N. Africa, USSR, Central Asia, China or Korea. Also, **SELL** glassine envelopes in three convenient sizes; take fountain pen and stamp pad ink well. Eduardo C. Welling M., Apartado Postal 701, Merida, Yucatan, MEXICO (2/4)

Exchange or Purchase: Cicadellidae and Carabidae worldwide. All letters answered. Gary A. Dunn, Department of Entomology, Michigan State University, East Lansing, MI 48824-1115 U.S.A. (2/4)

For Sale: Elefant brand insect pins. Send SASE for prices. Thomas Greager, R. D. #6, Box 56-B, Greensburg, PA 15601 U.S.A. (2/4)

Exchange: Lepidoptera (worldwide), especially Nymphalidae and Pieridae; also other families--Hesperiidae, Papilionidae, etc., and Coleoptera (worldwide), especially Cerambycidae and Scarabaeidae. All letters welcome and answered. Luis R. Perez, HC 02 Box 18881, San Sebastian, Puerto Rico 00755 U.S.A. (2/4)

Wanted: Cerambycidae from all over the world in exchange for specimens from Europe and the Soviet Union. Elvira Barchet, 6470 Clybourn Ave., #242, North Hollywood CA 91606. U.S.A. Telephone (213) 761-3764. (2/4)

For Exchange: Will exchange many species of butterflies from Mayalasia, Phillipines, Taiwan, some from Africa, Peru, Brasil, and Europe, all in A1 quality, for A1 specimens from other countries (USA, Canada, Central America, South America, Australia, Indonesia, India, etc.). Exchange preferred, but can also buy. Please write to Patrick M. Malesieux, 87, rue Delhaye 59 148 Flines les Raches, FRANCE, (2/4)

For Sale: Large selection of papered Malaysia Butterflies, beetles, and other insects, all of A1 quality with date. Free catalog available from: Deco Enterprise, P.O. Box 155, TAIPING, Malaysia (2/4)

For Sale or Exchange: Many insect orders from the Southeast U.S., including cecropias, Dianas, stag beetles and cicada killers. Quantities very limited. Write for complete details. Bryan Belay, Rt. 1, Box 291, Pearisburg, VA 24134

Wanted: Information and advise on giant silk moth (cecropia, promethea, polyphemus and luna) mating behavior and male assemblages. Also, suggestions for a reference for identification of North American mantids and other Orthoptera. Gary J. Lovell, 3818 Watson, Toledo, OH 43612 U.S.A (3/1)

Wanted: Deadstock (specimens) of any insect for life-cycle displays. Any size acceptable, but must be in reasonable condition; this includes cocoons, pupae, larvae, immature insects (prefer Lepidoptera, though). Willing to buy/trade. Ryan Bridge, 4329 Old Orchard Road, York, PA 17402 U.S.A. (3/1)

Exchange Wanted: Will exchange Cicindelidae and other insects from New York state and New England for any part of the U.S. or world. All letters will be answered. Michael A. Valenti, 135 Jamesville Ave., Syracuse, NY 13210 U.S.A. (3/1)

Free Publication: "A Planting Guide for Virginia Nectar-Seekers" by Patricia M. Purdy (a Y.E.S. member) and Jeffrey M. Curtis (Wildlife Education Coordinator for State of Virginia) and published by the Virginia Non-Game Wildlife Fund. This 18 page pamphlet is packed with information for attracting birds and butterflies. Send requests to: Young Entomologists' Society, Department of Entomology, Michigan State University, East Lansing, MI 48824-1115 U.S.A. (3/1)

Help Needed: A small library at a USDA sponsored research center in Saudi Arabia has notified Y.E.S. that they would be very appreciative of a donation of any entomology books or periodicals. They are in dire need of many out-of-print books (especially Coleoptorum Catalogue, 1910-1940, The Hague) on taxonomy, biology and the like. They would also be interested in corresponding with taxonomic entomologists who might be able to assist with various Saudi research projects. To make donations, or for further information, contact Dorothy Jessop, USDA/OICD, Room 4103 Auditors Bldg., Washington, DC 20250 (202) 475-4190. (Ed. Note: They are now receiving all Y.E.S. publications.) (4/1)

Wanted: Willing to identify, exchange or purchase buprestids on a worldwide basis. Please contact: Dr. Stanley Wellso, Department of Entomology, Michigan State University, East Lansing, MI 48824-1115 U.S.A. (3/1)

For Sale: Philippine insects--dried and papered specimens. Please contact Elizabeth Lumawig, P.O. Box 2684, Manila, PHILLIPPINES. (3/1)

For Sale or Exchange: Butterflies and moths, also some odd insects, I collected in New Zealand last winter. Also, Lepidoptera from North America, Europe and Japan, including several much-sought western species and subspecies. John Reichel, P.O. Box 789, Revelstoke, British Columbia, VOE 2S0, CANADA (3/1)

For Sale: Sphingidae, Nymphalidae, Saturniidae, Heliocoridae, Ithomiid sp., Caligos, and Morphidae. Also, Automeris, sp., Euchroma gigantea, Titanus gignateus, Harlequin, long horn beetles, Megasoma elephas, golden scarab and others. Darien Compound Safaris, P.O. Box 909, Panama 9A, REPUBLIC OF PANAMA. (3/1)

For Sale: The rarest Rhopalocera from Reunion Island (near Madagascar). Quality A1, papered, named. **For Exchange:** Insects from Reunion, all of A1 quality, named with data. **Wanted:** Morpho, Papilio, Agrias preforia, Saturniidae, Danaidae, Ornithoptera, Troides, Dynastinae, Lucanidae, Goliathidae, Buprestidae, Phasmidae--top quality, papered and with complete data. ALSO, willing to offer information, publications, and identifications on insects of the madagascarene area. T. Claude Anderes, 18 Residence Caravelle, Blve. de la Providence, 97400 St. Denis, Ile de la REUNION (FRANCE). (3/1)

Wanted: Correspondence with retired entomologists with background in tropical Lepidoptera and Hemiptera. Also, I am willing to share some native California Lepidoptera with young entomologists. Write to: Dr. Joe Vredenburg, 6656 Trigo "B", Goleta, CA 93117 U.S.A. (3/1)

Wanted: Phasmida (stick and leaf insects). Livestock and deadstock. I specialize in this order, and in particular seek *Timema* species from California and other areas (eggs). I can purchase or exchange for Phasmida other orders. All letters answered. Paul D. Brock, "Papillon", 40 Thorndike Rd., Slough, SL 2 1 SR. ENGLAND. (3/1)

Wanted: Butterflies and Coleoptera, especially scarabaeidae and Lucanidae, from Central and South America, especially Columbia, Peru, Bolivia, or Venezuela. I would prefer to buy, rather than trade. Send all lists/letters to Tetsuo Nawa, The Nawa Insect Museum, Gifu Park, 2-18 Ohmiya-cho, Gifu City, JAPAN (3/1)

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Compiled by Gary A. Dunn
Y.E.S. Advisor/Editor

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COLORS: Sand, Light Blue, Red, Kelly Green, Pink and Lilac

Baseball Jerseys - White Body / Colored $\frac{1}{4}$ Sleeves (50/50 Blend)

COLORS: Red, Kelly Green, Royal Blue and Black

Sweatshirts (50/50 Blend)

COLORS: Grey, Light Blue, Red and White

**ADULT**

Sizes: SM 34-36 / MED 38-40 / LG 42-44 / X-LG 46-48

Short Sleeve T-Shirts (50/50 Blend)

COLORS: Sand, Ecru, Yellow, Light Blue, Kelly Green, Red, Silver, Pink, Lilac, White, Gold and Teal

Long Sleeve T-Shirts (50/50 Blend)

COLORS: Light Blue, Red, Silver, Pink and White

Sleeveless T-Shirts (50/50 Blend)

COLORS: White, Light Blue, Yellow, Pink, Lilac, Teal and Red

Baseball Jerseys - White Body/Colored $\frac{3}{4}$ Sleeves (50/50 Blend)

COLORS: Red, Kelly Green, Royal Blue and Black

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COLORS: White, Grey, Light Blue and Red

XXL and XXXL T-Shirts (50/50 blend)

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1 - 10	8.50	7.00	11.50	8.50	8.50	8.50	9.50	8.50	15.50	14.50
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51 - 100	5.55	4.95	7.50	5.55	5.55	6.95	7.55	6.95	12.50	11.50

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